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CONTRIBUTION TO THE SPECIES COMPOSITION AND BIOLOGY OF PENAEID PRAWNS IN THE JAFFNA LAGOON

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A b s t r a c t *Metapenaeus monoceros, Penaeus semisulcatus, P indicus, P latisulcatus* and *P monodon* are the five species of penaeid prawns found in the Jaffna lagoon *M monoceros* with an average species composition of 62 7% was the dominant species in the Jaffna lagoon, followed by *P semisulcatus,* with 28 5% The average contributions of *P indicus, P latisulcatus* and *P monodon* to species composition were 4 8%, 2 4% and 1 5% respectively

Growth studies using modal progression analysis have indicated that *M monoceros* and *P semisulcatus* have average growth of 9 17 mm month $^{-1}$ and 12 5 mm month $^{-1}$ respectively and that the fishery of these species in the Jaffna lagoon is supported by the 0 - year class The calculated total length-weight relationship gives values varying from 2 6827 to 3 0242 for the different species

Generally all the species showed a predominace of females during 1986 and 1987 The females of all the five species recorded are larger than the males

Food analysis of the stomach contents reveals that animal materials comprising Annelids, Molluscs, Insects, Crustaceans, Miscellaneous chitin and detritus varying from 59 5% to 69 3% form the main dietary component of all the five species

INTRODUCTION

The need for a substantial increase in supply of animal protein and the significant earnings in foreign exchange have stimulated interest in prawn industry in Sri Lanka and abroad Most of the current production of prawns in Sri Lanka comes from lagoons (ADCB Report, 1980) The Jaffna lagoon is the largest water body situated in the northern part of Sri Lanka

S a t c h i t h a n a n t h a n & T h e v a t h a s a n (1970) have reported the topography and substratum of the Jaffna lagoon Investigations carried out by C h i t r a - v a d i v e l u & A r u d p r a g a s m (1983) have indicated that there are five species of penaeid prawns in the Jaffna lagoon and that they are collected mainly by four gears The efficiency of the fishing gears used in prawn fishery in the Jaffna lagoon has been reported by C h i t r a v a d i v e l u (1989)

The Jaffna lagoon has an area of approximately 421 km^2 The lagoon is shallow and its depths do not exceed 4 0 meters It lies between approximately 70° 50 E, to 80° 38' E long and 9° 26' N to 9° 46' N lat The lagoon is connected to the sea at Ponnalai between Karaitivu and Kaytes and between Kalmunai and Mandaitivu Five distinct bays - Ponnalai Bay Velichavedu Bay, Kalundai Bay, Ariyalai Bay and Kachchai Bay are marked out in the lagoon (S a t c h i t h a n a n t h a n & P e r e r a , 1970)

The present investigation undertaken from January 1986 to December 1987 was to study the species composition and some aspects of biology of the penaeid prawns in the Jaffna lagoon. This will add to the understanding of the prawn fishery, help the growing interest in shrimp culture in Sri Lanka and aid in the adoption of suitable management measures.

MATERIALS AND METHODS

Bimonthly random samples of prawns were taken from the total catch of similar gears of identical dimensions, operated for a day, from ten landing centres in the Jaffna lagoon. To maintain uniformity, the gears were either supplied or partly financed and cost of maintenance met by the investigator, throughout the period of study.

Prawns are caught in the Jaffna lagoon mainly by (i) Sirahu valai or stake net (ii) Drag net (raal valai) (iii) Hoop net (raal hoodu) and (iv) Kandi (trap or tidal weirs or cone cage or aproned cone cage). The structure and mode of operation of these gears are described in detail by Pearson (1923), Satchithananthan & Thevathasan (1970), Kurian & Sebastian (1976) and Chitravadivelu (1987) The drag net is an active gear while the other three are passive gears (Laevastu, 1965)

The date of collection and the name of the landing centres were recorded for each sample collected. Samples were brought to the laboratory for detailed analysis.

The temperature of the air and surface water, pH and salinity were recorded at each station. Rainfall data was obtained from the Meterological Office at Kankesanthurai.

Initially, each sample was separated into different species, sexed and the number of specimens in each species was counted. The carapace length and total length of each specimen were measured to the nearest millimeters, the former using a Vernier caliper and the latter using a measuring board. The carapace length is the distance from the orbital notch to the posterior dorsal margin of the carapace and the total length is the distance from the tip of the rostrum to the tip of telson (Garcia & Reste, 1981). Ohaus Triple Beam balance (Model 700) was used to determine the weight of each specimen to the nearest milligram

Monthly average percentage species compositions were computed taking the number of specimens of each species in the samples from different gears on a particular day The study is based on 470 samples comprising 42,792 penaeid prawns.

Besides determining the sex ratio, the prawns in each species were grouped into 05 mm intervals and the monthly length – frequencies were calculated

Stomach was removed intact from randomly selected specimens and the contents of the stomach of each specimen were then spread on a millimeter grid. Each item was separated into one the assigned food categories (Table 1), identified as far as possible, the number of each item counted and an estimate was made of the area occupied by each item. The percentage of contribution of each food item, in terms of the area occupied by them and category were then calculated

RESULTS AND DISCUSSION

Hydrographic factors

The monthly variations of air and surface water temperatures and rain fall are shown in Fig. 1. Fig. 2. gives the monthly variation in pH and salinity. The air temperature was the lowest in November 1986 (20.05 °C) and September 1987 (25.20°C). In 1986, the lowest temperature of surface water was recorded in December (22.3°C). March recorded the lowest surface water temperature of 23.6°C in 1987.

Table 1. Percentage composition of food of the different species of Penaeid prawns from the Jaffna lagoon in 1986 and 1987. A – *P. monodon*, B – *P. indicus*, C – *P. semisulcatus*, D – *P. latisulcatus* and E – *M. monoceros*

Numbers investigated	A	B	C	D	E
	132	124	126	107	113
	% composition of food items				
Angiosperm	29.50	28.60	38.35	29.31	31.30
Algae.					
Centric dioatoms	0 04	0.83	1.80	0 05	1.41
Pennate diatoms	0 61	0 77	0 15	0.61	0 21
Oscillatoria sp.				0.18	
Gleocapsa sp.					0.11
Lyngbya sp.		0 42			
Cladophora sp.		2.03		1.01	
Chlorella sp	0.44	0 21	0 08	0.40	0 51
Cosmarium sp.		0 12	0 08		
Padina sp.		0.25			
Animals					
Annelida		1.80	2.37	5.41	2.10
Mollusca	7 33	2.40	5.57	11.40	3.14
Insecta	15 40	3 35	10.60	3.31	10.66
Crustacea	10.51	24 51	3.40	7.46	7.18
Miscellaneous chitin		2 34		0 37	
Animal matter unidentified	12 16	8 07	8.00	2 45	9 49
Detritus	24 01	24.30	29.60	39 60	32 24
TOTAL	100 00	100 00	100.00	100.00	100 00

The Jaffna lagoon had the lowest salinity of 16.5 ppt. in January 1986 (Fig. 2). In the same year highest salinities were recorded during August and September and were in the range of 34.5 ppt. and 34.75 ppt. In 1987, the lowest salinity of 20.25 ppt. was recorded in January and the highest of 36.3 ppt. in August (Fig. 2).

The lagoon water was either neutral of slightly alkaline during 1986 and 1987 (Fig. 2). In 1986, the lowest pH of 7.00 was in February, September, October and November; the highest pH of 7.63 was in March. During 1987, the lowest pH of 7.00 was recorded in January and the highest of 7.72 in August. Highest rainfall in 1986 was during January, October, November and December. In 1987 there was rain only during January and September.

Species composition

Metapenaeus monoceros, Penaeus semisulcatus, P. indicus, P. latisulcatus and P. monodon are the five species of penaeid prawns found in the Jaffna lagoon.

The monthly variations in percentage species composition obtained from the cumulative catches for 1986 and 1987 are shown in Fig. 3a and 3b. From the monthly cumulative catches it is apparent that the *M. monoceros* is the predominant species during all the months in 1986 except April (Fig. 3a). In April, *P. semisulcatus* dominated in species composition with 59.5% followed by *M. monoceros* with 36.5%. In 1987 *M. monoceros* was the dominant species throughout the year with species composition varying from 35.9% to 89.0% (Fig. 3b). In 1986, the highest species composition of *M. monoceros* was 82.5%.

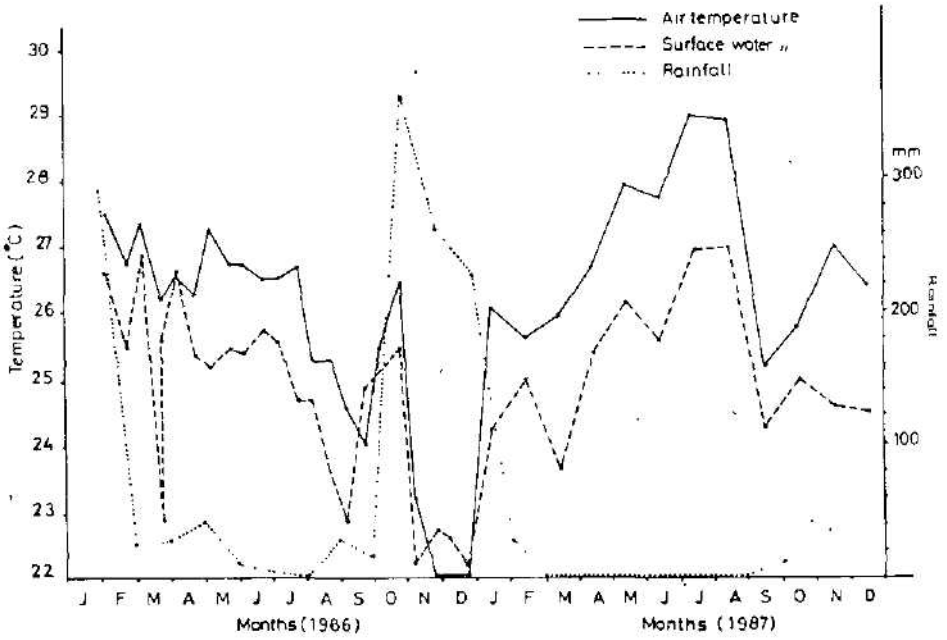

Fig. 1. Monthly variation of air and surface water temperature and rainfall in 1986 and 1987 in the Jaffna lagoon.

Table 3 gives the yearly average percentage species composition of prawns in the Jaffna lagoon, computed from the cumulative catches during 1986 and 1987. *M. monoceros* with an average species composition of 62.7% is the dominant species in the Jaffna lagoon, followed by *P. semisulcatus* with 28.5%. The average contributions of *P. indicus, P. latisulcatus* and *P. monodon* to species composition were 4.8%, 2.4% and 1.5% respectively.

Table 2. Percentage composition of the different food categories in the different species of Penacid in the Jaffna lagoon during 1986 and 1987

	% composition of food categories				
Plant material:					
Angiosperm	29.50	28.60	38.35	29.31	31.30
Algae	1.09	4.63	2.11	1.06	3.52
Animal material	45.40	42.47	29.94	30.03	32.94
Detritus	24.01	24.30	29.60	39.60	32.24
Total	100.00	100.00	100.00	100.00	100.00

Table 3. Annual average percentage species composition of prawns in the Jaffna lagoon computed from cumulative catches of all the gears in 1986 and 1987. Ranges are within brackets

Year	Average percentage species composition and range				
	P. monodon	*P. indicus*	*P. semisulcatus*	*P. latisulcatus*	*M. monoceros*
1986	1.46 (0.0 - 12.0)	2.22 (0.5 - 9.5)	33.15 (18.5 - 59.5)	2.05 (0.5 - 6.0)	61.12 (6.5 - 82.5)
1987	1.55 (0.0 - 8.21)	7.46 (0.25 - 24.0)	23.86 (9.93 - 39.34)	2.75 (0.58 - 12.30)	64.38 (37.25 - 89.0)
Annual average	1.51	4.84	28.50	2.40	62.75

July in 1986 and November in 1987 recorded the highest species composition for *M. monoceros* while April in 1986 and May in 1987 recorded the highest species composition for *P. semisulcatus.*

An examination of the hydrographic factors and the species composition (Fig. 1, 2, 3a & 3b) does not indicate any correlations.

The monthly fluctuation in abundance of these species indicate that all these are migratory species. This conforms to the observations of De Bruin (1971) from his study of fluctuations in species composition of Penaeid prawns in estuaries in Sri Lanka.

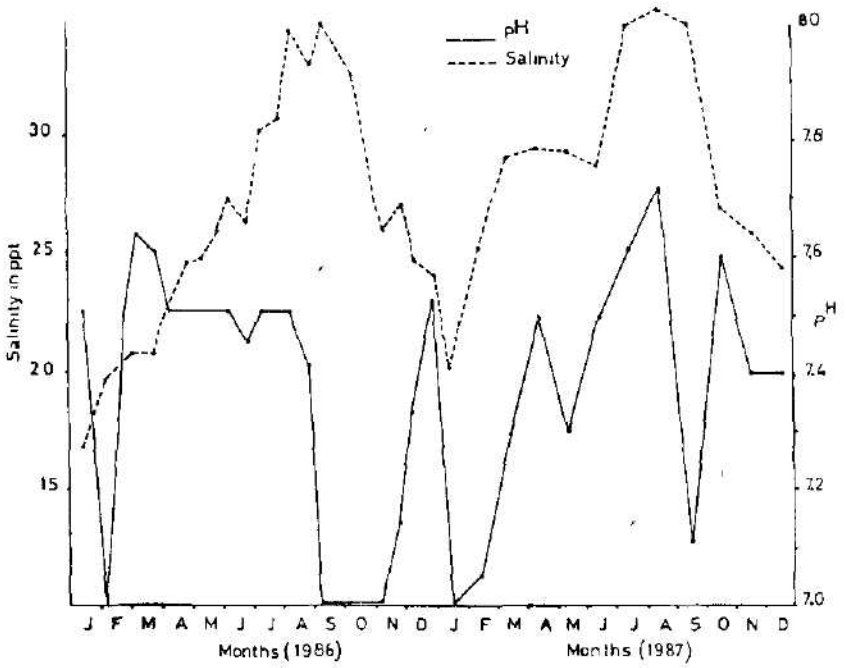

Fig. 2. Monthly variation of pH and salinity in the Jaffna lagoon in 1986 and 1987.

Growth

In the present investigation length frequency data of *M. monoceros* and *P. semisulcatus* has been used to estimate age and growth from month to month modal progression analysis. The method is similar to that followed by Menon (1955), George (1959), Subramanyam & Ganapati (1975), Bishara (1976) and Ahmed (1981). This analysis could not the applied to the other three species due to insufficiency of length frequency data of the samples for such analysis.

The modal sizes of *M. monoceros* for 1986 and 1987 are shown in Fig. 4. The smallest specimens (20 mm) appeared with very low frequency during April 1986 and February 1987. The majority have a total length between 40 mm and 80 mm in 1986 and between 43 mm and 84 mm in 1987. In 1986 the modal shift started from 48 mm in January to 58 mm in February with a growth rate of 10 mm month^{-1}. Progression of modes from 48 mm in March to 68 mm in May and another from 53 mm in July to 88 mm in November

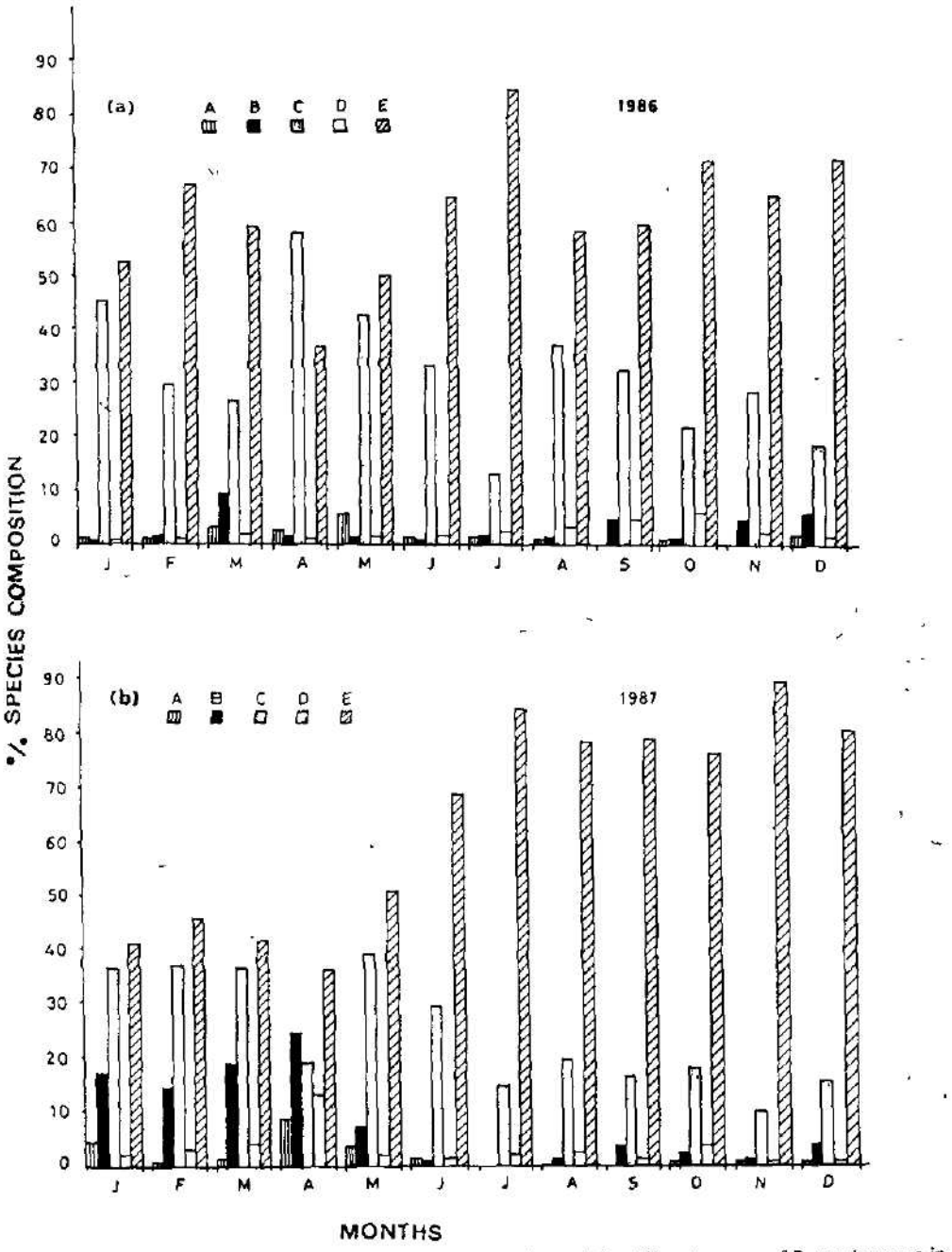

Fig. 3. Average monthly variations of percentage composition of the different species of Penaeid prawns in the Jaffna lagoon during (a) 1986 and (b) 1987.
A – *P. monodon*, B – *P. indicus*, C – *P. semisulcatus*, D – *P. latisulcatus*, E - *M. monoceros*

Table 4. Percentage of females in the cumulative catches during different months in 1986

Species	Percentage of females during different months												
	J	F	M	A	M	J	J	A	S	O	N	D	Average & range
P. monodon	18.5	50.0	59.2	28.0	29.6	00.0	66.7	00.0	-	100	-	40.0	39.2 (00 0–100)
P indicus	46.0	46.7	55.0	34 0	36.7	100	52.5	62.0	45.3	100	50.0	52 4	56.7 (34.0–100)
P. semisulcatus	40.7	43 5	42.9	46.3	50.0	51 0	58 1	52.8	50.0	60 5	49 5	52 6	46.1 (40.7–60 5)
P. latisulcatus	25.0	54 2	42.0	71.4	48.5	-	53.0	42.4	49.0	51.8	50.0	47.6	48.6 (25.0–71.4)
M. monoceros	33 2	64.9	40.3	61 2	46.0	-	58.0	53.7	57.7	48 5	55 5	41.8	50 9 (33.2–61.2)

Table 5. Percentage of females in the cumulative catches during different months in 1987

Species	Percentage of females during different months												
	J	F	M	A	M	J	J	A	S	O	N	D	Average & range
P. monodon	83 8	37.5	00.0	69.0	44.4	27.3	-	-	-	95.0	52.0	-	51.1 (00.0-95 1)
P. indicus	60.4	51.1	48.6	54 0	42.6	100	-	100	100	90.6	42.6	57.5	67.9 (42.6-100)
P. semisulcatus	51.4	24.9	49.7	55.5	47.3	42.1	64.9	88.9	89.4	63.0	55.6	58.4	57.6 (24.9-89.4)
P. latisulcatus	11.4	47.5	38.9	66.7	44.4	50.0	81 3	45.0	88.9	53.0	50.2	47.3	52.1 (11.4 - 88.9)
M. monoceros	46 9	70.5	75.4	67.1	70 6	70.3	66.9	50.9	61 7	57.6	61.3	62.0	63.4 (46.9-75.4)

could be traced, the former gives a growth rate of 10 mm month^{-1} and the latter 8.75 mm month^{-1}

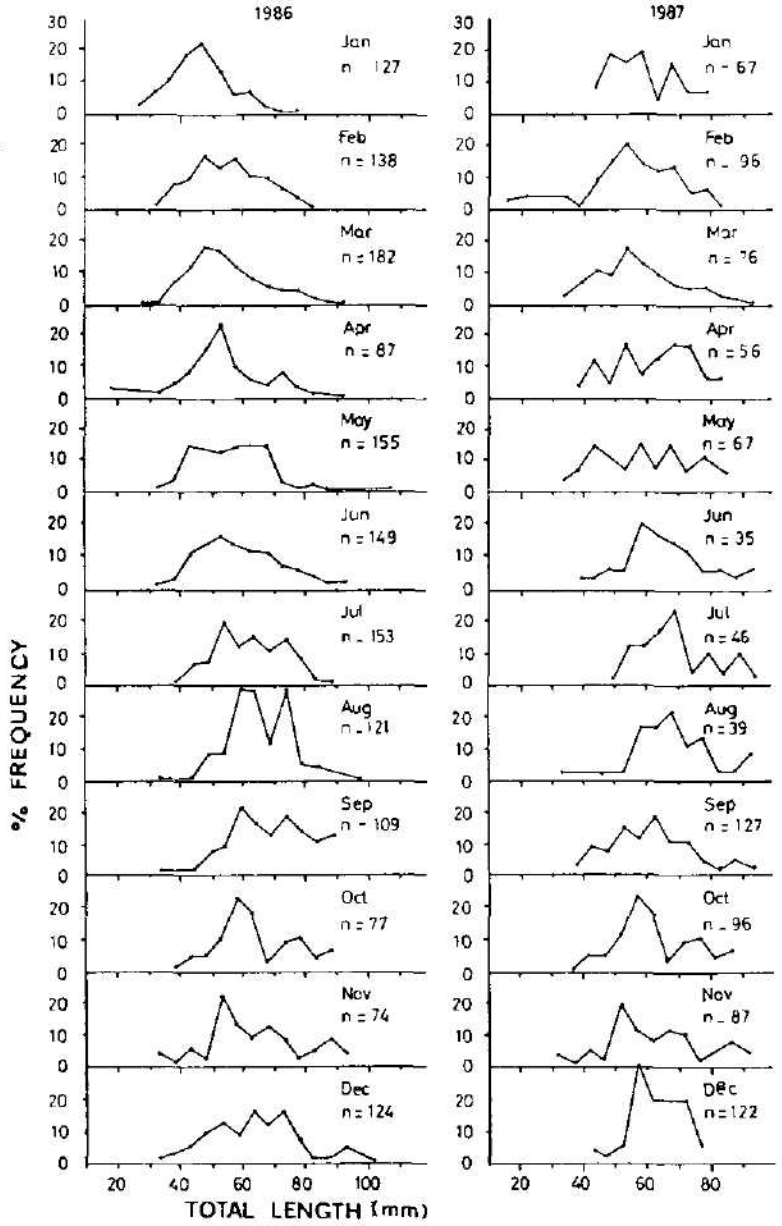

Fig 4 Monthly length – frequency distributions of *M. monoceros* in the Jaffna lagoon during 1986 and 1987

In 1987 the mode 53 mm in March appeared to shift to 88 mm in July giving a growth rate od 8 75 mm month ^{1} The highest modal sizes of *M monoceros* which appeared in the fishery were 93 mm in 1986 and 88 mm in 1987

The smallest specimens of *P semisulcatus* (20 mm) appeared with very low frequency in April 1986 and February 1987 The majority have a total length between 48 mm and 104 mm in 1986 and between 53 mm and 108 mm in 1987 (Fig 5) In 1986 progression of modes from 48 mm in January to 118 mm in July and another from 58 mm in September to 98 mm in December are traceable A growth rate of 11 67 mm month^{-1} in the former and 13 33 mm month^{-1} in the latter are discernable In 1987, the mode in March at 78 mm, shifted to 88 mm in April and 103 mm in May giving a growth rate of 12 5 mm month^{-1} Another mode 88 mm in July appeared to shift to 103 mm in August and 113 mm by September giving a growth rate of 12 5 mm month^{-1}

The average rates of growth assessed from the modal progression in size frequency distribution are 9 17 mm month ^{1} (8 75 mm month ^{1} – 10 0 mm month^{-1}) for *M mono-*

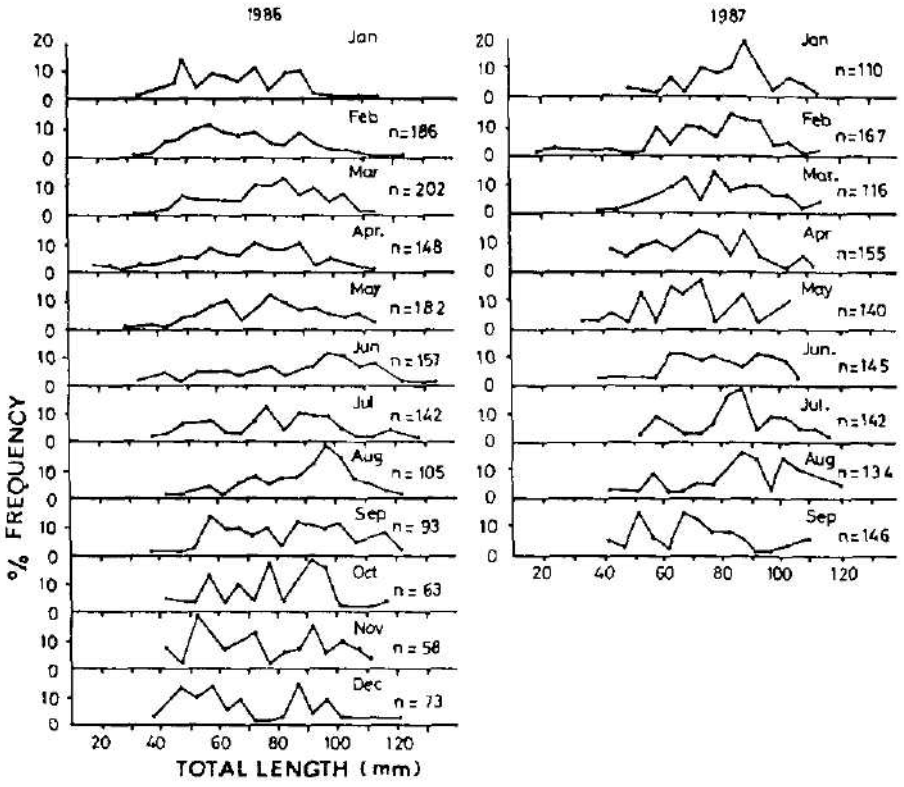

Fig 5 Monthly length – frequency distributions of *P semisulcatus* in the Jaffna lagoon during 1986 and 1987

ceros and 12.5 mm month^{-1} (11.67 mm month^{-1} – 13.33 mm month^{-1}) for *P. semisulcatus*. Subramanyam & Rao (1970) have reported a growth rate of 15.0 mm mont.$^{-1}$ for the post larvae of *M. monoceros* from Roopnarayan estuary while Ahmed (1988) has indicated a growth rate of 8.22 mm month^{-1} for the same species in Satkhira brackish water area in Bangladesh.

An examination of the length frequency distribution shows that the majority of *P. monoceros* and *P. semisulcatus* are in the length range of 40 mm – 84 mm and 48 mm – 108 mm respectively, which may be considered to represent the first year group, taking into consideration their monthly average rate of growth. It therefore appears that the fishery of these species in the Jaffna lagoon is supported by only 0 – year class.

The appearances of smaller modal values for both species in April 1986 and February 1987 indicate that recruitment takes place prior to these months. The variations in the period of recruitments during these two years are apparently due to different intensities of rain (Fig. 1).

Sex-ratio and maximum total lengths

In 1986, both *M. monoceros* and *P. semisulcatus* showed a predominance of females during seven months (Table 4). *M. monoceros* showed a predominant female ratio throughout 1987 while *P. semisulcatus* showed female dominance during eitht months (Table 5). Among other species *P. indicus* showed more female dominance both during 1986 and 1987. Subramanyam & Ganapati (1975) have also reported a female dominance in the Godovari estuarine system.

No gravid females of the five species under investigation were recorded in the Jaffna lagoon, during the 24 months of investigation, indicating that they are spawning outside the lagoon (De Bruin, 1971). The five species *M. monoceros, P. semisulcatus, P. indicus, P. latisulcatus* and *P. monodon* fall in the general scheme of penaeid prawns in the tropical waters – breeding in the sea, growing larval juveniles entering the lagoon, feeding and growing in the lagoon, migrating into the sea for further maturation and reproduction.

In Table 6, the total length of the largest male and female prawns of the different species caught during 1986 and 1987 in the Jaffna lagoon are presented and compared with maximum lengths, reported by other authors. According to the data of Fischer & Bianchi (1984), the females of the species under investigation are larger than the males. In the present investigation also the females recorded are larger than the males in *M. monoceros, P. semisulcatus, P. indicus, P. latisulcatus* and *P. monodon*.

Chitravadivelu & Selvanayagam (1969) had reported the maximum total length of unsexed *P. monodon* and *P. indicus* from Thondaimannar lagoon as 18.5 cm and 13.5 cm respectively (Table 6). These total lengths are almost identical to the maximum total lengths of the above species caught during the present investigation.

Table 6. Maximum total length of the different species caught in the Jaffna Lagoon during 1986 and 1987 compared with other data

Species	Maximum total length in cm				
	Present investigation 1986 and 1987		Reported by Fischer and Bianchi (1984)		Reported by Chitravadi-velu and Selvavinayagam (19
	Male	Female	Male	Female	Unsexed
P. monodon	16.0	18.9	26.8	33.7	18.5
P. indicus	13.0	13.5	18.4	23.0	13.5
P. semisulcatus	13.8	17.8	18.0	23.0	
P. latisulcatus	13.0	16.0	16.2	20.2	
M. monoceros	10.2	10.5	15.0	20.0	-

Table 7. Length - weight relationship of the different species of Penaeid prawns from the Jaffna lagoon, w = weight in grm, L = total in cm, C = carapace, length in cm

Species	Sex	Total length - weight relationship	carapace length - weight relationship
P. monodon	M	$w = 0.0084567\ L^{3.0058}$	$w = 0.71973\ C^{2.9022}$
	F	$w = 0.0083445\ L^{3.0078}$	$w = 0.71080\ C^{2.8634}$
P. indicus	M	$w = 0.0057597\ L^{3.0242}$	$w = 0.84917\ C^{2.9202}$
	F	$w = 0.0063285\ L^{2.9794}$	$w = 0.87791\ C^{2.8213}$
P. semisulcatus	M	$w = 0.0090740\ L^{2.9674}$	$w = 0.89326\ C^{3.0125}$
	F	$w = 0.0112050\ L^{2.8836}$	$w = 1.02620\ C^{2.7501}$
P. latisulcatus	M	$w = 0.0145310\ L^{2.7386}$	$w = 0.68344\ C^{2.7758}$
	F	$w = 0.0169940\ L^{2.6827}$	$w = 0.85994\ C^{2.5303}$
M. monoceros	M	$w = 0.0090469\ L^{2.9351}$	$w = 0.83946\ C^{2.7002}$
	F	$w = 0.0081470\ L^{3.0041}$	$w = 0.76809\ C^{2.8908}$

Length - weight relationship

Conversion equations for length and weight are a convenient tool in the biological analysis of fishery data. The relationship between (i) total length and wet body weight and (ii) carapace length and wet body weight are expressed by the equations:

$w = aL^b$ and $w = aC^b$

Where w = wet weight in grams,
L = total length in cm
C = carapace length in cm,
a and b are constants.

The value of b indicates the increase of weight with length.

Table 7 gives the equations for the relationship between length and weight. In the present investigation the value of b for total length – weight relationship varies from 2.6827 to 3.0242. The corresponding values for *P. semisulcatus* reported for shrimps in the South China Sea Area (SCS/GEN/81/30, 81) ranges from 2.952 to 3.013 for male and 3.142 to 3.160 for female. In the case of *P. latisulcatus* the figures reported range from 3.001 to 3.057 in male and 3.063 to 3.136 in female. The b values of male and female *P. semisulcatus* from the Jaffna lagoon compares favourably with the reported values while the values of *P. latisulcatus* when compared with the reported values show that the increase in weight with length is less.

Food

132 *P. monodon*, 124 *P. indicus*, 126 *P. semisulcatus*, 107 *P. latisulcatus* and 113 *M. monoceros* were used in the food analysis. Food analysis of the stomach contents reveals that animal materials comprising Annelids, Molluscs, Insects, Crustaceans, Miscellaneous chitin and detritus varying from 59.54% to 69.63% form the major dietary component (Table 1 and 2). In *P. latisulcatus* the percentage of detritus (39.60%) is more than the rest of the animal matter. Molluscs with 11.40% among animal materials, followed by crustaceans with 7.46% are the dominant components. In *P. monodon*, *P. semisulcatus* and *M. monoceros* items of insects dominate with 15.40%, 10.60% and 10.66% respectively, among animal matter. In *P. indicus* crustaceans dominate with 24.51%.

In all the species of prawns under investigation, plant materials comprise Angiosperm (mainly *Thallasia* sp.), Centric diatoms, Pennate diatoms, *Oscillatoria* sp., *Gleocapsa* sp., *Lyngbya* sp., *Cladophora* sp., *Chlorella* sp., *Cosmarium* sp. and *Padina* sp. and vary from 30.59% to 40.46%. Among plant materials, Angiosperm (mainly *Thallasia* sp.) varying from 28.60% to 38.35% form the dominant component (Table 1). Algae contribute to 1.09% to 4.63%. In *P. indicus*, *Cladophora* sp. with 2.03% form the dominant algal component. In *P. monodon*, *P. latisulcatus* and *M. monoceros*, Centric and Pennate diatoms dominate among algae with 0.65%, 1.95%, 0.66% and 1.62% respectively.

The amounts and kinds of food items found in the stomach contents of prawns merely reflected the available food supply and possibly, biotype preference, because of the

omnivorous eating habits of these Penaeid prawns. Penaeid prawns have been described as „ominivorous scavengers" or „detritus feeders" (D a l l , 1968). The results of the present investigation indicate that *P. monodon, P. indicus, P. semisulcatus, P. latisulcatus* and *M. monoceros* from the Jaffna lagoon conform to the above description.

Acknowledgement

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GROWTH POTENCY OF THE RUFFE (GYMNOCEPHALUS CERNUUS, PISCES, PERCIFORMES) IN THE RESERVOIR SLAPY (CENTRAL BOHEMIA)

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A b s t r a c t . The age, length and weight growth of 1525 specimens (from O AG to 6 AG) of the ruffe *(Gymnocephalus cernuus* (Linnaeus, 1758)) of the reservoir Slapy in 1985-87 are presented. Equations after von Bertalanffy, length-weight relationship and Fulton's coefficient are calculated. The phenomenon of R. Lee is also discussed. Differences between both sexes are analyzed. The growth rate of the ruffe from the reservoir Slapy is compared in various types of stagnant waters within Czechoslovakia.

INTRODUCTION

From the point of fishery practics, the ruffe, *Gymnocephalus cernuus* belongs to so-called scrab fishes and as the human food is used exceptionally. From published data seems to be certain, it is the short-aged fish. It inhabits rivers, reservoirs, backwaters and in the Central Europe also artificial fish ponds. The comparison of the ruffe's growth within Czechoslovakia and abroad is given by B a s t l (1965), J o h a l (1980), S a n j o s é (1984), M a š á t o v á & Z á v ě t a (1988).

MATERIAL AND METHODS

The specimens under study were caught using nets (further details see H a n e l , 1990) in the reservoir Slapy. Specimens were obtained in following localities: Stará Živohošť, May, 18, 1985, n = 4; Nová Živohošť, October, 12, 1985, n = 125; (males), n = 144 (females), without sex determination n = 309; June, 21, 1986, n = 128 (males), without sex determination n = 111; October, 11, 1986, n = 127 (males), n = 95 (females), without sex determination n = 27, May, 16, 1987, n = 400 (males), n = 6 (females). The sex was ascertained using dissection.

The age was determined from the scale structure by the use of the projecting apparatus "Documator Lesegerät DL II" using the 17.5 times magnification. In all specimens ventrodiagonal radius of the scale was measured. The Rosa Lee's method was used for the back calculation of the length growth. With respect to lacking smallest young of the year I have used the correction of 19 mm of the body length (see J o h a l , 1980; M a š á t o v á & Z a v ě t a , 1988). The back calculation of the weight was performed using the method following R o u n s e f e l l & E v e r h a r t (1960). The length growth evaluation was made by the use of the growth characteristics (see H a n e l , 1990). The weight growth was compared using index of the production (see P i v n i č k a , 1972) The Fulton's coefficient (K_F) was calculated using the common formula (see e. g. H a n e l , 1990). The phenomenon of Rosa Lee was analyzed by the use of the method previously described by H a n e l (1982). The basic data about the reservoir Slapy were summarized by H a n e l (1990).

RESULTS AND DISCUSSION

I. Length growth

Concerning re-calculation between body and total lengths (I have found caudal fin decreased with the increasing of the body length in all samples, the average equation from the total sample of the ruffe from the reservoir Slapy was: TL/BL = 1.300 - 0.001 BL (r = -0.493), ranges of the body length 55 - 118 mm.

Table 1. Body length of young of the year in the ruffe from the Slapy reservoir (n = number of individuals)

locality	date of the capture	n	body length (mm)
Nová Živohošť	4. 8. 1986	14	34-59 (48.0)
Nova Živohošť	11. 10. 1986	5	45-51 (47.0)
Nová Živohošť	22. - 28. 8. 1987	30	27-45 (37.6)

At the end of the month of August, 1987, the fry (young of the year) of the ruffe grew upto the average body length 38 mm, in the mid-October 1986 average body length was 47 mm (see Tab. 1). Oliva & Vostradovský (1960) have found analogous average length at the sample of the ruffe from the reservoir Slapy in June 1958 (n = 13, ranges BL 44 - 52 mm).

Table 3 Parameters of the von Bertalanffy's equation in the ruffe from the Slapy riverine lake (l_∞ - the teoretically attainable maximum length, K - the growth coefficient, t_0 - the hypothetical starting age)

locality	date of capture	sex	l_∞	K	t_0
St. Živohošť	18. 5 1985		122	0.363	0.085
N. Živohošť	12. 10. 1985		98	0.523	0.139
N. Živohošť	12. 10. 1985	females	100	0.511	0.298
N. Živohošť	12. 10. 1985	males	92	0.573	0.172
N. Živohošť	21. 6. 1986		114	0.454	0.037
N. Živohošť	21. 6 1986	males	112	0.364	0 357
N. Živohošť	11. 10. 1986		87	0.638	0.024
N. Živohošť	11 10 1986	males	123	0 392	0 100
N. Živohošť	11. 10. 1986	females	121	0.392	0.044
N Živohošť	16. 5. 1987	males	112	0.387	0 230
N. Živohošť	16. 5. 1987	females	100	0.620	0.013

Table 2. Average length growth of the ruffe in the Slapy riverine lake (in mm of the body length)

locality	author	date of the capture	n	age	sex	l_1	l_2	l_3	l_4	l_5	l_6
Bučily, Živohošť	Johal (1980)	1957–58	97	1+ – 5+		54	73	89	100	113	
Slapy riverine lake	Oliva & Vostradovský (1960)	1958	112			54	72	94	95	103	107
St. Živohošť	own values	18. 5. 1985	4	2+ – 5+		40	59	79	93	103	
N. Živohošť	own values	12 10. 1985	125	1+ – 4+	males	42	59	75	84		
N. Živohošť	own values	12. 10. 1985	144	1+ – 5+	females	43	60	74	87	94	
N. Živohošť	own values	12. 10. 1985	309	1+ – 4+		42	59	77	87		
N. Živohošť	own values	21. 6. 1986	128	1+ – 6+	males	40	54	70	80	93	103
N. Živohošť	own values	21. 6. 1986	111	1+ – 4+		44	65	83	97		
N. Živohošť	own values	11. 10. 1986	127	1+ – 5+	males	45	63	78	92	109	
N. Živohošť	own values	11. 10. 1986	95	1+ – 5+	females	42	62	82	95	105	
N. Živohošť	own values	11. 10. 1986	27	1+ – 3+		42	60	75			
N. Živohošť	own values	16. 5. 1987	400	1+ – 6+	males	40	57	73	85	95	103
N. Živohošť	own values	16. 5. 1987	6	2+ – 3+	females	47	69	85			

Table 4. Calculation of the phenomenon of Rosa Lee in the ruffe from the Slapy reservoir (**males and females** together). Specimens hatched in 1984. $\bar{x}$ – mean decrease in mm per year

age group	n		l_1	l_2	l_3
1	139		47		
2	220		44	65	
3	162		41	59	75
	521	$\bar{x}$	-3.0	-6.0	-

Table 5. Comparison of the length growth of the ruffe by means of the C_{lh} index in some native waters

locality	author	$C_{lh(2-4)}$	$C_{lh(2-5)}$	$C_{lh(2-6)}$
Zablatsky rybnik artificial pond, 1982	Sanjose (1984)	64	80	-
Ženich, artificial pond, 1954	Sanjose (1984)	60	80	-
Orlik, riverine lake, 1983	Mašatova & Zavěta (1988)	54	-	-
Pastviny, riverine lake, 1957	Oliva & Vostradovsky (1960)	47	57	63
Slapy, riverine lake, 1958	Oliva & Vostradovsky (1960)	47	53	59
Machovo jezero, artificial pond, 1951	Johal (1980)	47	-	-
Slapy, riverine lake, 1985–87	own values	44	54	66
Orava, riverine lake	Balon (1967)	44	53	65
Orava, riverine lake	Bastl (1965)	42	50	57
Slapy, riverine lake, 1957–58	Johal (1980)	41	53	-
Kličava, riverine lake	Sanjose (1984)	39	63	-
Ponědražský rybnik, artificial pond, 1954	Johal (1980)	39	48	55

The whole sample of the ruffe in 1985–87 formed 1476 specimens, which can be divided into 7 age groups (from O AG upto 6 AG). The most frequent were 2 AG (40% in average of the total sample), 3 AG (32%), 4 AG (13%) and 1 AG (15%). The most frequent were specimens with the body length 78–82 mm (17% of the total sample), 73–77 mm (16%), 83–87 mm (15%), 68–72 (13%) and 88–92 mm (12%). The maximum body length of 118 mm was found in male caught in Oct., 11, 1986 (weight 33 g, K_F = 2.01, 5 AG).

Following B e r g (1949) the length of the ruffe within the former USSR ranges mostly between 100–150 mm, rarely 250–300 mm, but from Siberian waters specimens upto 500 mm are known. Within Czechoslovakia the biggest specimen (220 mm TL) was angled in the River Sázava (Central Bohemia) in 1965 (H a n e l , 1984).

The average length growth in the Slapy reservoir during 1957–58 and 1985–87 is presented in Tab. 2 and 3. The average length growth of females and males during period 1985–87 was as follows (body length in mm, females n = 245, males n = 780, females/males): l_1 – 44/42, l_2 – 64/58, l_3 – 80/74, l_4 – 91/85, l_5 – 100/99, l_6 – /103. The average length growth of the ruffe based on 1476 specimens (males and females together) in the reservoir Slapy in 1985–87 was (in mm of the body length): l_1 – 42, l_2 – 61, l_3 – 77, l_4 – 89, l_5 – 100, l_6 – 103. Concerning length growth the broad variability was found in the ruffe from the reservoir Slapy. Specimens with the body length (i. e. 81–108 mm) can belong to four age groups and therefore "determination" of the age only using body length is impossible. As a results the average length growth in our own material from 1985–87 was worser as compared with data of J o h a l (1980) concerning the same locality in

Table 6. Parameters of the body length/weight relationship in the ruffe from the Slapy reservoir (locality Nova Živohošť)

date of capture	n	sex	ranges of body length (mm)	a	b
12. 10. 1985	125	males	58 – 102	-4 1079	+2.6981
12. 10. 1985	143	females	71 – 111	-3.7424	+2.5212
12. 10. 1985	309		51 – 99	-3 9385	+2.6016
21. 6. 1986	128	males	50 – 110	-3 5120	+2.3853
21. 6. 1986	44	females	65 – 100	-3.6863	+2.4939
11. 10. 1986	127	males	59 – 118	-4.5558	+2.9128
11. 10. 1986	95	females	60 – 115	-4.5551	+2.9198
11. 10. 1986	27		48 – 94	-4.2802	+2.7613
16. 5 1987	6	females	74 – 94	-4.6425	+2.5422
16. 5. 1987	400	males	41 – 116	-4.0439	+2.6898

Table 7. Relationship between body length and Fulton's coefficient (K_F) in the ruffe from the Slapy reservoir (locality Nová Živohošť), r – correlation coefficient

date of capture	sex	equation	r
12. 10. 1985	males	$K_F = 1.5389 + 0.0007$ BL	+0 105
12. 10. 1985	females	$K_F = 3.3426 - 0.0139$ BL	-0.627
12. 10. 1985		$K_F = 3.0554 - 0.0126$ BL	-0.620
21. 6. 1986	males	$K_F = 3\ 4492 - 0\ 0166$ BL	-0.519
21. 6. 1986	females (before spawning)	$K_F = 3.1419 - 0.0104$ BL	-0.233
21. 6. 1986	females (after spawning)	$K_F = 5.8299 - 0\ 0494$ BL	-0.581
21. 6. 1986		$K_F = 2.5353 - 0.0093$ BL	-0.346
11. 10. 1986	males	$K_F = 2.0995 - 0.0017$ BL	-0 148
11 10. 1986	females	$K_F = 2\ 5406 - 0.0062$ BL	-0.456
11. 10 1986		$K_F = 2.4263 - 0.0071$ BL	-0 348
16 5 1987	males	$K_F = 2\ 8567 - 0\ 0076$ BL	-0 898
16 5. 1987	females	$K_F = 3.9363 - 0.0019$ BL	-0 301

1957–58. R. Lee's phenomenon of the ruffe reduces the length -3.0 mm (l_1) and -6.0 (l_2) a year on average (see Tab. 4). Using growth data given by Mašátová & Závčta (1988) for the reservoir Orlík I have calculated analogous values of R. Lee's phenomenon

In Table 5 average values of growth characteristics for various Czechoslovak stagnant waters are presented. The length growth using $C_{lh(2-5)}$ in the reservoir Slapy in 1957–58 was found to be 53 and during 1985–87 varied between 47–60. Ranges within Czecho-

Table 8. Comparison of the index of production (P_I) in the ruffe in the Slapy reservoir (locality Nova Živohošť)

date of capture	sex	$P_{I(2-4)}$	$P_{I(2-5)}$
12 10. 1985	males	14	-
12. 10. 1985		13	-
21. 6. 1986		11	-
11. 10 1986	males	15	24
11. 10. 1986	females	14	17
16. 5 1987	males	15	20

slovak stagnant waters (artificial ponds and reservoirs) were between $C_{lh(2-5)}$ = 47–80. More rapid length growth using this index was found in artificial ponds Ženich, Záblatský rybník and reservoirs Oravská nádrž, Pastvinská nádrž and Kličavská nádrž.

II. Weight growth

Parameters of length-weight relationship for the back calculation of the weight from samples obtained in the examined locality are summarized in Table 6. The "b" parameter ranged from 1.9981 to 2.9198; in females was as 2.6198 and in males 2.6654 in average. For the evaluation of the length and weight growth Fulton's coefficient (K_F) was calculated. The relationship of this index to the body length is summarized in Table 7. Fulton's coefficient was found to be as decreasing in all examined samples in dependence of the body length excepting males caught on Oct. 12, 1985. In my own material I have found ranges at females between 1.24–4.37 and at males 1.19–4.63. The highest values were found at specimens (male 60 mm BL, weight 10 g, female 65 mm, weight 12 g) caught before spawning on June 21, 1986. The values of the so called index of the production (P i v n i č k a , 1972) in the reservoir Slapy are presented in Table 8. In the period 1985 – 87 values of this index of production between $P_{I(2-4)}$ = 11-15 or $P_{I(2-5)}$ = 17-24 were found.

SUMMARY

In 1985–87 the age, length and weight growth of the ruffe (*Gymnocephalus cernuus* (Linnaeus, 1758)) in the reservoir Slapy (Central Bohemia) were studied. The length growth of females was more rapid than in males. The phenomenon of R. Lee was distinct. The length growth using $C_{lh(2-5)}$ in the reservoir Slapy during 1957–58 and 1985–87 varied between 47–60, index of production between $P_{I(2-5)}$ = 17-24. The population of the ruffe in the reservoir Slapy in 1985–87 can be designated concerning average length growth as growing around the mean found within Czechoslovak and foreign stagnant waters, too.

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SOIL NEMATODES IN A MEADOW-SPRUCE FOREST ECOTONE

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A b s t r a c t . The soil nematode communities were studied in a meadow-spruce forest ecotone in Central Bohemia. In the ecotone, the increase of nematode density and diversity (edge effect) was found, and the trophic structure of nematode communities changed across the meadow-forest boundary. The formation of ecotonal nematode community was more affected by the meadow than by the forest

The edge (or ecotonal) effect is discussed in the latest years in connection with the SCOPE project "Ecotones" (d i C a s t r i et al., 1988). The majority of present data on this theme concerns higher plants or vertebrates, but little information is available on invertebrates and soil biota.

O d u m (1971) in his classical "Fundamentals of Ecology" gives a definition of the ecotone, and it was used in different forms by many other ecologists. A more exact definition was given by d i C a s t r i et al. (1988): "Ecotone is zone of transition between adjacent ecological systems, having a set of characteristics uniquely defined by space and time scales, and by strength of the interactions between adjacent ecological systems." The edge effect often results in density and biodiversity increase and in presence of species with special demands for environmental conditions in the ecotone. On the other hand, the ecotone can be a barrier for species migration across the boundary between the two adjacent ecosystems. The aim of this tudy was to investigate the edge effect on soil nematodes.

SITE DESCRIPTION AND METHODS

The ecotone between a meadow and *Luzuleto pilosae - Abietum* forest type was studied in Central Bohemia near Jevany u Prahy (350 m a. s. l., 49°58'N, 14°48'E), soil type cambisol. The ecotone is situated on the SW forest edge Five zones parallel to the forest edge were determined for the study of soil nematodes (cf R u s e k , 1989; Fig. 1):

Zone 1 (meadow) was on a mild, humid, recultivated meadow. Humus form is mull Dominant grasses are *Dactylis glomerata* L. and *Deschampsia caespitosa* P. - Beauv. accompanied by *Holcus lanatus* L , *Poa* cf. *angustifolia* (L.), *Carex leporiana* L., *Plantago major* L., *Chrysanthemum leucanthemum* L , *Alchemilla vulgaris* L. s. l , *Achillea millefolium* l.

Zone 2 (meadow edge) was on a meadow edge. Grasses domunante this zone but their density is lower than in the meadow, and 20% of the soil surface is covered with mosses The plantcover is composed of *Festuca rubra* L., *Deschampsia caespitosa, Agrostis tenuis* Sbth., *Melampyrum pratense* L., *Crysanthemum leucanthemum, Selinum carvifolia* L., *Galium pumillum* Murr., *Ajuga reptans* L., *Lysimachia nummularia* L , *Hypericum maculatum* Cr., and others. Humus form is mull.

Zone 3 (outer forest edge) was below a forest tops. It is composed of trees and shrubs of *Quercus robur* L., *Pinus silvestris* L., and *Betula verrucosa* Ehrh., and *Festuca ovina* L., *Luzula albida* (Hoffm.), *Hieracium sabaudum* L., *H. murorum* L., *Melampyrum pratense*, mosses and lichens *(Cladonia* spp.) in understory. This zone is strongly exposed to sunshine the whole year long. The soil is covered with a 2–3 cm deep layer of micro-arthropode moder.

Zone 4 (inner forest edge). Shrubs and herbs are almost missing in the understory, only some tufts of *Luzula albida* are present there. Soil surface is covered with 1–2 cm of oak and pine litter. Humus form is moder, forming a 3–5 cm layer.

Zone 5 (spruce forest) was inside spruce stand *(Picea abies* L.) with sporadic fir trees *(Abies alba* L.). In the understory only sparse tufts of *Luzula albida* and cushions of moss *(Polytrichum* sp.) are present. Humus form is moder, forming 1–3 cm horizon covered with 1 cm layer of spruce litter.

The soil samples were taken on 19th March and 27th May 1986 in five two metres long rows parallel to the forest edge. Each row represented one of the ecotone zones. The distance between zones 1–2 and 4–5 was 5 metres, the distance between zones 2–3 and 3–4 was 5 metres. In each row 10 soil samples were taken to the depth of 10 cm using cylindrical corer with an area of 1 cm^2. Nematodes were isolated from soil samples by a modified Baermann's funnel method, fixed by hot FAA and transferred to anhydrous glycerine (Šály, 1983)

The index of diversity H' was calculated according to Shannon & Weaver (1949) in (Odum, 1971) on the base of natural logarithm. The mean biomass of adults of nematode species was estimated according to Andrássy (1956), and the biomass of juveniles was counted as one half of the biomass of adult specimens (Šály, 1975). The nematodes were divided into five trophic (ecological) groups according to Wasilewska (1971), but the genus *Filenchus* was added to the mycophages in contradistinction to her. Thus, the species 1–34, 70–72 and 74 represented bacteriophages, 35–41, 43–51, and 54–57 mycophages and some facultative phytophages, 58–69, 52–53 phytophages, 79–92 omniphages, and 73, 75–77 predators.

The faunistic similarity between nematode communities in different zones was calculated on the base of Sorensen's index. The classification of the nematode communities was made by agglomerative method. The dendrograms were produced from the genera abundance or standardized genera abundance by Euclidean distance and Ward's clustering algorithm (Orloci, 1978). The data were analysed using the cluster analysis package CLUSTAN (Wishart, 1981).

RESULTS

92 species of soil nematodes were found in the studied area (Tab. 1). The number of species ranged from 18 (zone 4, May) to 59 (zone 2, March) for the individual zones. At the same time, the species diversity H' was found to be 1.36 in zone 5 (March), and 2.97 in zone 2 (March) (Tab. 3). As to the species and genera composition, zones 1 and 2 were the most similar, and zones 1 and 5 the less similar (Tab. 2).

The mean abundance of nematodes in all zones was higher in March ($1.7 \pm 4.2 \times 10^6$ ind.m^{-2}) than in May ($0.5 \pm 1.5 \times 10^6$ ind.m^{-2}). In March, the highest abundance was in zone 2, in May, in zone 3 (Tab. 3). The abundance did not differ significantly in zones 1, 3, and 4 in March, and in zones 1, 2, and 3 in May.

The portion of adult specimens was the lowest in zone 1 (about 30% of the nematode community on both sampling times), a higher portion was in zone 2 (about 43%). In zones 3 and 5 the proportion of adults differred in March and in May. The highest differences were found in zone 4, i. e. 34% of adults in March and 58% in May (Tab. 3).

The trophic structure of the nematode communities in different zones of the ecotone was diverse (Tab. 3). The dominance the of mycophagous forms increased from the meadow to the forest. On the contrary, the dominance of the phytophages decreased from the meadow

Table 1. Abundance (x 10^3 ind.m^{-2}) of nematode species in five zones of meadow-spruce forest ecotone, A - March 19th 1986, B - May 27th 1986, bold figures indicate constant species

Zone	1		2		3		4		5	
Order: MONHYSTERIDA	A	B	A	B	A	B	A	B	A	B
1. *Geomonhystera villosa* (Bütschli, 1873)	-	-	-	1	-	-	2	-	-	-
Order: ARAEOLAIMIDA										
2. *Anaplectus granulosus* (Bastian, 1865)	1	-	2	1	-	1	7	-	-	-
3. *Plectus acuminatus* Bastian, 1865	**1**	-	**2**	**19**	**99**	**105**	**87**	**49**	15	**30**
4. *Plectus cirratus* Bastian, 1865	-	-	-	1	-	-	1	-	-	1
5. *Plectus geophilus* de Man, 1880	-	-	1	-	-	-	14	-	2	-
6. *Plectus longicaudatus* Bütschli, 1873	1	**4**	**8**	**4**	-	-	21	-	4	3
7. *Plectus parvus* Bastian, 1865	-	-	-	-	1	-	**65**	2	**88**	-
8. *Plectus rhizophilus* de Man, 1880	1	1	11	-	1	-	-	-	-	1
9. *Plectus sambesii* Micoletzky, 1915	-	-	3	-	-	**91**	-	-	2	**14**
10. *Plectus silvaticus* Andrássy, 1985	-	-	-	1	2	-	**21**	-	3	-
11. *Plectus* sp. 1	-	-	**5**	-	1	-	-	-	-	1
12. *Plectus* sp. 2	1	-	1	-	-	-	1	-	1	-
13. *Wilsonema otophorum* (Bütschli, 1873)	-	-	-	-	-	5	17	-	1	-
Order: RHABDITIDA										
14. *Teratocephalus terrestris* (Bütschli, 1873)	-	-	-	-	1	-	**8**	-	2	-
15. *Metateratocephalus crassidens* (de Man, 1880)	-	1	-	-	-	-	-	-	1	-
16. *Cephalobus persegnis* Bastian, 1865	**30**	**32**	**17**	-	-	3	12	-	-	-
17. *Cephalobus parvus* Thorne, 1937	-	-	-	-	-	-	1	-	-	-
18. *Cephalobus troglophilus* Andrássy, 1967	8	3	47	**31**	-	4	-	-	-	-
19. *Eucephalobus mucronatus* (Kozlowska & Roguska-Wasilewska, 1963)	**36**	9	14	-	-	-	-	-	-	-

Table 1. Cont.

Zone	1		2		3		4		5	
	A	B	A	B	A	B	A	B	A	B
20. *Eucephalobus exyuroides* (de Man, 1876)	47	26	24	1	-	-	-	-	-	-
21. *Eucephalobus striatus* (Bastian, 1865)	2	1	-	-	-	-	-	-	-	-
22. *Heterocephalobus elongatus* (de Man, 1880)	101	19	101	23	18	13	25	8	43	17
23. *Heterocephalobus loofi* Andrassy, 1968	1	-	-	-	-	-	-	-	-	-
24. *Acrobeloides nanus* (de Man, 1880)	209	243	414	241	393	227	226	56	225	40
25. *Acrobeloides* sp.	-	-	-	-	-	-	9	-	-	-
26. *Chiloplacus* sp.	3	-	1	-	-	-	-	-	-	-
27. *Ypsylonellus vexilliger* (de Man, 1880)	-	-	-	-	-	-	39	-	-	-
28. *Acrobeles* sp.	-	-	-	-	-	-	1	1	1	1
29. *Panagrolaimus rigidus* (Schneider, 1866)	20	172	75	93	2	4	3	2	6	2
30. *Panagrolaimus spondyli* Körner, 1954	-	-	3	34	-	19	-	-	-	-
31. *Rhabditis* s. l.	146	71	152	14	6	30	18	-	4	4
32. *Bursilla monhystera* (Butschli, 1873)	42	14	98	2	1	-	-	-	-	-
33. *Diplogaster* s. l.	-	-	-	-	-	-	1	-	-	-
34. dauer larvae	-	-	-	-	-	-	-	2	-	3
Order: TYLENCHIDA										
35. *Aphelenchus avenae* Bastian, 1865	3	6	143	7	-	-	-	-	-	1
36. *Paraphelenchus pseudoparietinus* (Micoletzky, 1922)	5	89	41	7	3	1	-	-	-	-
37. *Aphelenchoides parietinus* (Bastian, 1865)	-	-	5	-	10	1	5	9	23	5
38. *Aphelenchoides saprophilus* Franklin, 1957	99	122	162	94	400	122	390	39	119	70
39. *Aphelenchoides stammeri* Körner, 1954	-	-	-	-	-	-	-	-	-	2
40. *Aphelenchoides* sp. 1	24	57	20	3	15	23	110	12	-	11

Table 1. Cont.

Zone	1		2		3		4		5	
	A	B	A	B	A	B	A	B	A	B
41. *Aphelenchoides* sp. 2	-	-	-	-	-	-	5	69	-	-
42. *Seinura* sp.	1	10	-	-	-	-	-	-	1	-
43. *Filenchus discrepans* (Andrassy, 1954)	7	29	174	16	83	76	-	-	-	11
44. *Filenchus helenae* (Szczygiel, 1969)	3	8	18	3	174	29	69	-	-	2
45. *Filenchus minutus* (Cobb, 1893)	64	7	708	202	246	352	661	381	1 111	238
46. *Filenchus orbus* (Andrássy, 1954)	9	-	45	27	-	37	234	15	-	3
47. *Filenchus polyhypnus* (Steiner & Albin, 1946)	-	-	-	-	6	5	-	-	3	-
48. *Filenchus vulgaris* (Brzeski, 1963)	22	5	-	-	-	-	-	-	-	-
49. *Lelenchus leptosoma* (de Man, 1880)	-	-	4	13	2	-	13	-	-	-
50. *Tylenchus ritae* Siddiqi, 1963	-	-	68	-	109	-	-	-	-	-
51. *Malenchus bryophilus* (Steiner, 1914)	1	-	-	-	-	3	12	-	1	-
52. *Aglenchus agricola* (de Man, 1884)	-	2	-	20	69	7	-	-	-	-
53. *Coslenchus costatus* (de Man, 1921)	3	7	1	-	4	-	-	-	-	-
54. *Ditylenchus* sp.	4	8	37	23	4	15	10	2	24	6
55. *Neoditylenchus* sp.	-	-	-	-	-	-	-	-	2	-
56. *Nothotylenchus* sp.	-	-	1	-	-	-	-	-	-	-
57. *Boleodorus volutus* (Lima et Siddiqi, 1963)	8	-	-	-	-	-	-	-	-	-
58 *Tylenchorhynchus dubius* (Bütschli, 1873)	7	22	71	-	-	-	12	-	-	-
59 *Merlinius brevidens* (Allen, 1955)	1	-	1	-	-	-	1	-	-	-
60. *Helicotylenchus digonicus* Perry, 1959	86	17	1	-	2	2	1	-	-	-
61. *Helicotylenchus pseudorobustus* (Steiner, 1914)	22	51	80	-	81	52	10	5	-	-

Table 1. Cont.

Zone	1		2		3		4		5	
	A	B	A	B	A	B	A	B	A	B
83. *Eudorylaimus* sp. 1	1	2	4	1	2	4	-	-	-	-
84. *Eudorylaimus* sp. 2	3	-	2	-	-	1	-	-	-	-
85. *Discolaimus* sp.	-	-	-	-	-	-	1	-	-	-
86. *Aporcelaimellus obscurus* (Thorne & Swanger, 1936)	30	40	115	21	4	21	32	-	3	-
87. *Aporcelaimellus obtusicaudatus* (Bastian, 1865)										
88. *Pungentus thornei* Goodey, 1943	195	77	35	14	-	-	-	-	-	-
89. *Dorylaimellus* sp.	4	2	-	-	-	-	-	-	-	-
90. *Tylencholaimus mirabilis* (Bütschli, 1873)	-	-	-	-	5	-	2	-	-	-
91. *Tylencholaimus stecki* Steiner, 1914	11	-	6	-	-	21	89	3	-	-
92. *Tylencholaimellus striatus* Thorne, 1939	-	9	-	-	-	-	-	-	-	-
number of species in sample	53	39	59	38	37	38	46	18	29	23
number of constant species in sample	18	17	27	11	9	14	17	6	7	6
number of species in zone	57	64	50	49	40					
number of constant species in zone	19	18	9	9	6					

Table 1. Cont.

Zone	1		2		3		4		5	
	A	B	A	B	A	B	A	B	A	B
62. *Rotylenchus goodeyi* Loof & Oostenbrink, 1958	-	-	386	8	405	7	-	-	4	-
63. *Paratylenchus crenatus* Loof, 1960	117	69	79	24	129	3	-	-	2	-
64. *Paratylenchus audriellus* Brown, 1959	1	-	168	153	5	10	1	-	-	-
65 *Paratylenchus microdorus* Andrassy, 1959	674	42	212	229	101	-	-	-	3	-
66. *Paratylenchus projectus* Jenkins, 1956	263	93	554	91	83	99	39	-	3	-
67. *Paratylenchus* sp.	-	-	4	-	-	-	-	-	-	
68. *Macroposthonia rustica* (Micoletzky, 1915)	1	-	-	1	-	-	-	-	-	-
69. *Xenocriconemella macrodora* (Taylor, 1936)	-	-	-	-	-	1	-	-	-	-
Order: ENOPLIDA										
70 *Bastiania gracilis* de Man, 1876	-	-	1	-	-	-	-	-	-	-
71. *Alaimus primitivus* de Man, 1880	2	-	28	-	1	5	7	-	2	-
72. *Amphidelus dolichurus* (de Man, 1880)	-	-	1	-	-	2	-	-	2	-
73. *Tripyla* sp.	2	1	1	-	-	-	3	-	-	-
74. *Prismatolaimus intermedius* (Butschli, 1873)	2	-	1	-	-	-	-	-	-	-
Order: DORYLAIMIDA										
75. *Clarkus papillatus* (Bastian, 1865)	1	-	17	1	-	1	11	-	-	-
76. *Coomansus parvus* (de Man, 1880)	1	-	-	-	-	-	-	-	-	-
77 *Anatonchus tridentatus* (de Man, 1876)	-	-	12	5	-	-	-	-	-	-
78. *Nygolaimus brachyurus* (de Man, 1880)	-	2	1	1	-	-	-	-	-	-
79 *Dorylaimus* sp	2	1	1	-	-	-	1	-	-	-
80. *Mesodorylaimus bastiani* (Butschli, 1873)	1	-	-	-	-	-	-	-	-	-
81 *Eudorylaimus carteri* (Bastian, 1865)	-	-	1	-	1	-	-	1	-	2
82 *Eudorylaimus parvus* (de Man, 1880)	-		8	3	19	31	25	9	10	3

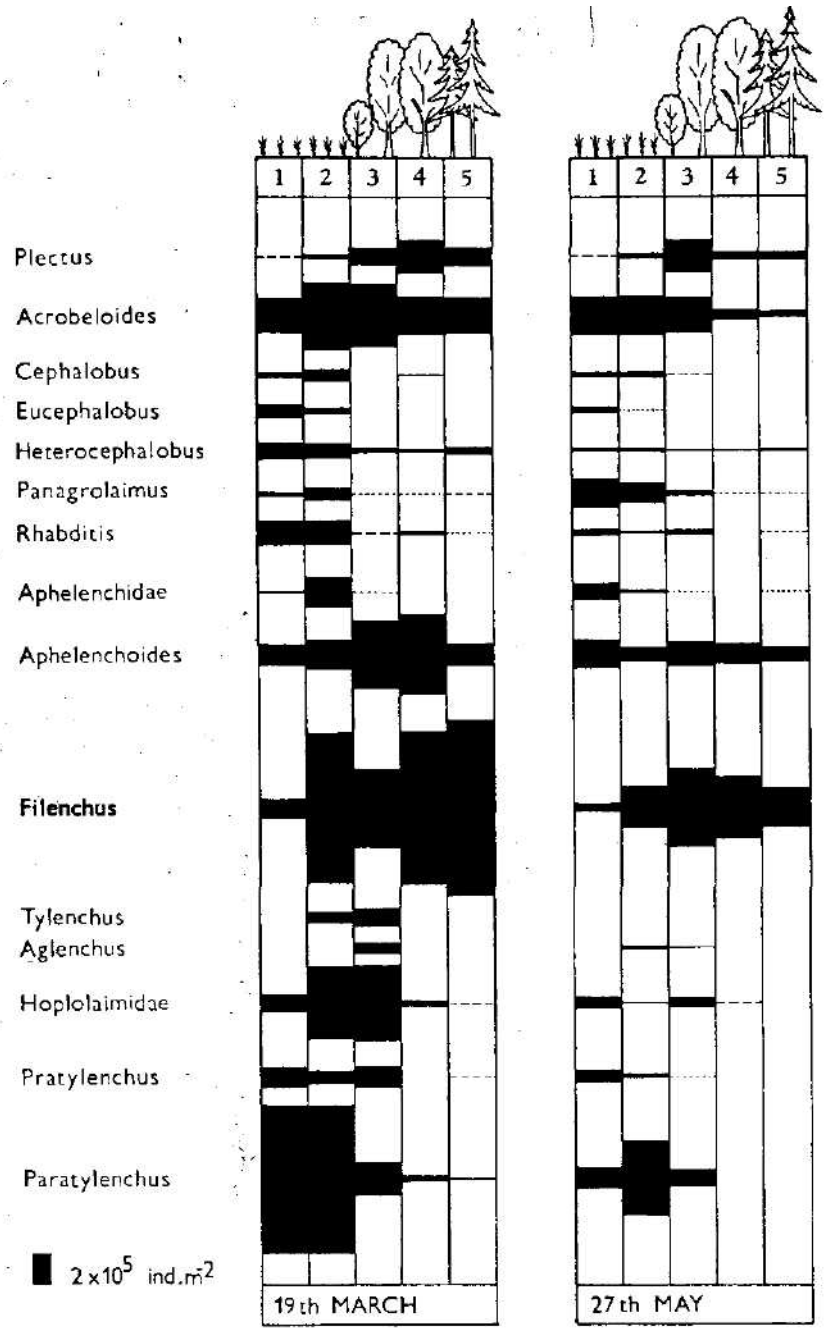

Fig. 1. Abundance of important nematode genera and families in different zones of meadow-spruce first ecotone.

to the forest. These trends mainly depended on the abundance of mycophagous genera *Filenchus* and *Aphelenchoides,* and phytophagous *Rotylenchus, Helicotylenchus,* and

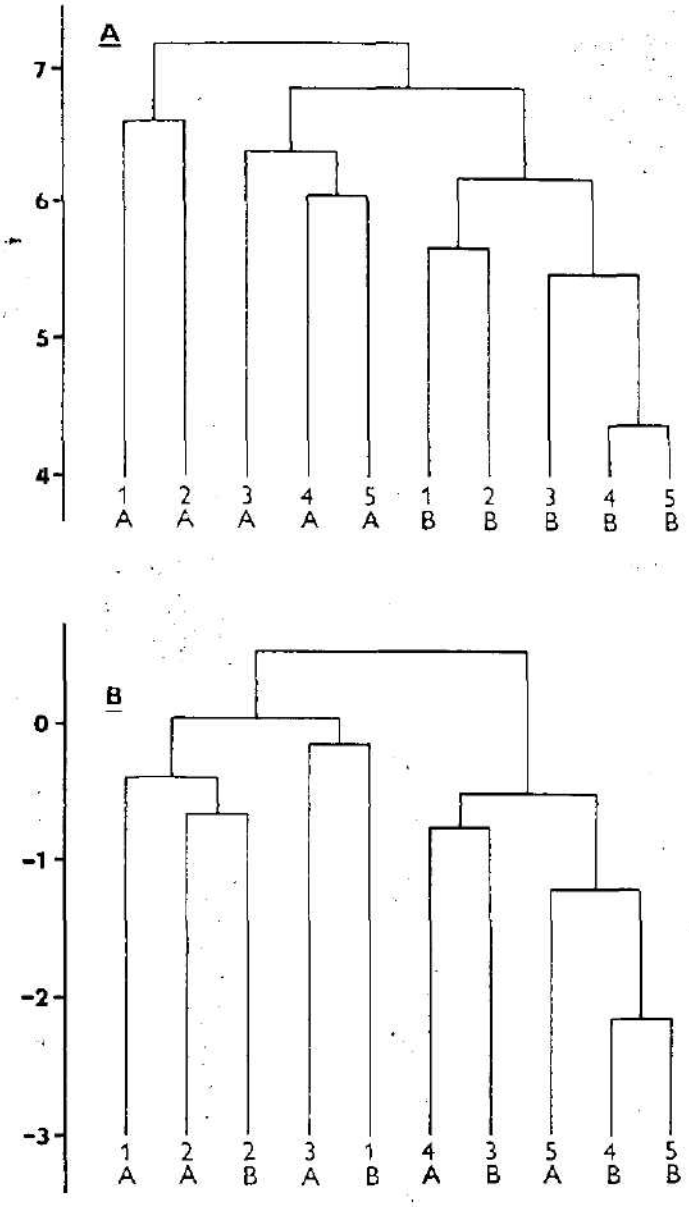

Fig. 2. Dendrograms of cluster analysis produced from
A – abundance of nematode genera
B – standardized abundance of nematode genera
1 – 5 – zones, A – March 19th, 1986, B – May 27th, 1986

Table 2. Faunistic similarity (Sorensen's index) of nematode communities in the different zones of ecotone; part A – species similarity, part B – generic similarity

A	1	2	3	4	5
1	-	0.76	0.62	0.53	0.43
2		-	0.75	0.62	0.58
3			-	0.63	0.69
4				-	0.61

B	1	2	3	4	5
1	-	0.81	0.65	0.63	0.51
2		-	0.73	0.63	0.51
3			-	0.68	0.69
4				-	0.59

Paratylenchus (Fig. 1). The abundance, as well as the dominance, of bacteriophages did not changed as in above mentioned groups. However, bacteriophagous representatives of the genus *Plectus* preferred forest to meadow, while genera *Panagrolaimus, Rhabditis, Cephalobus,* and *Eucephalobus* preferred a meadow biotope (Fig. 1). The omniphages had relatively low population densities in the ecotone (in the range of 5 – 237 x 10^3 ind.m^{-2}) as well as the predators (0 to 30 x 10^3 ind.m^{-2}).

The biomass of nematodes fluctuated between 0.16 and 1.67 g.m^{-2} (Tab. 3). In zones 1, 3, and 4 the biomass was almost identical in both sampling times, in zone 5 slightly increased in May, but in zone 2 biomass in March was higher than in May. The omniphages represented the main part of the biomass in zones 1 and 2, whereas in zone 5 the bacteriophages had the highest biomass on both sampling occasions. Zone 4 was characterized by the highest biomass of the omniphages in March, but the bacteriophages attained here the highest biomass in May. In zone 3, the phytophages and omniphages composed the main part of the biomass in March and in May, respectively.

The dendrogram based on the abundance of genera (Fig. 2A) shows a gradient of similarity from the meadow to the spruce forest. The most similar communities were in zones 4 and 5 in May; zone 3 was more related to zones 4 and 5 than to zones 1 and 2. The dendrogram produced from the standardized abundance (Fit. 2B) separated two groups of samples. The first group contained samples from zones 1 and 2. The second group contained samples from zones 4 and 5. Zone 3 belonged either to the first (March) or to the second (May) group of samples.

Table 3. Main ecological characteristics of soil nematode communities in different zones of meadow-spruce forest ecotone, abundance ± confidence limits (P = 0.05), (D) – dominance

Date		Zone 1	2	3	4	5
March 19th	Bacteriophages x 10^4 .m^{-2}	65 (28)	100 (24)	52 (21)	59 (25)	40 (23)
	Mycophages x 10^4.m^{-2}	25 (11)	143 (34)	109 (43)	151 (65)	128 (75)
	Phytophages x 10^4.m^{-2}	118 (51)	155 (37)	89 (35)	6 (3)	1 (1)
	Omniphages x 10^4.m^{-2}	24 (10)	17 (4)	3 (1)	15 (6)	1 (1)
	Predators x 10^4.m^{-2}	+ (+)	3 (1)	-	1 (+)	-
	Total abundance x 10^6.m^{-2}	2.3 ± 1.3	4.2 ± 1.4	2.5 ± 1.7	2.3 ± 1.0	1.7 ± 1.3
	% of adults	29.9	43.5	35.8	33.8	49.7
	Number of species	53	59	37	46	29
	H'	2.62	2.97	2.59	2.54	1.36
	Total biomass g.m^{-2}	0.76	1.67	0.41	0.56	0.16
May 27th	Bacteriophages x 10^4.m^{-2}	57 (42)	47 (33)	51 (35)	12 (18)	12 (25)
	Mycophages x 10^4.m^{-2}	34 (25)	39 (27)	67 (46)	53 (79)	35 (74)
	Phytophages x 10^4.m^{-2}	30 (22)	52 (36)	19 (13)	1 (1)	-
	Omniphages x 10^4.m^{-2}	13 (10)	4 (3)	8 (5)	1 (1)	+ (+)
	Predators x 10^4.m^{-2}	+ (+)	1 (1)	+ (+)	+ (+)	-
	Total abundance x 10^6.m^{-2}	1.4 ± 0.7	1.4 ± 0.5	1.5 ± 0.4	0.7 ± 0.2	0.5 ± 0.2
	% of adults	30.0	43.0	42.6	57.7	43.7
	Number of species	39	38	38	18	23
	H'	2.90	2.66	2.64	1.60	1.83
	Total biomass g.m^{-2}	0.67	0.39	0.34	0.56	0.46

The highest number of the characteristic species was in zone 4 (i.e. 10 species), the lowest one in zone 5 (i.e. 2). A total of 17 species was found in the ecotonal zones 2, 3, and 4 only, including, above all, *Lelenchus leptosoma, Panagrolaimus spondyli, Tylencholaimus mirabilis, Tylenchus ritae,* and *Geomonhystera villosa* (Tab. 1). These species can be regarded as "ecotonal species" in the meadow-spruce forest boundary studied, however, their abundance was low, as well as their dominance. The most abundant and constant species were found in all zones of the ecotone, although the species of the families Cephalobidae, Panagrolaimidae, Rhabditidae, Aporcelaimidae, and Nordiidae preferred the meadow biotope. The highest diversity of the genus *Plectus* was in the spruce forest, but the highest abundance of *P. acuminatus, P sambesii, or P. longicaudatus* was found in the ecotone.

DISCUSSION

Although many authors studied the soil nematode communities in meadow and forest ecosystems (see W a s i l e w s k a , 1979; Y e a t e s , 1979; S o h l e n i u s , 1980), information on spatial and temporal changes of nematode communities across an ecotone are practically absent. S a n d n e r & W a s i l e w s k a (1970) give some data on ecotone and M a l c e v s c h i (1978) found an increased nematode density between savannah and forest-gallery boundary in Ivory Coast.

In the ecotone studied, the nematode communities in the meadow and in the spruce forest were quite different. The most important differences were in the trophic structure, species diversity, and the percentage of adults in these communities. The density and diversity of nematode community in the spruce forest were lower in comparison to the meadow. The number of the important ecological groups of nematodes (i.e. with dominance = 10%) decreased from the meadow (4) to the forest (2) (Tab. 3). On the other hand, the number of species and the abundance and biomass in March in zone 2 (meadow edge) were higher than in the other zones. Evidently, no simple gradient of changes in the characteristics of the nematode communities across meadow-spruce boundary was found The nematode community in the meadow edge tended to increase the density and diversity in March, which can be characterized as the ecotonal effect. However, the intensity of this ecotonal effect probably depended on the season.

The species composition and the density of nematodes in zones 2, 3, and 4 probably depended on further soil fauna, too. The ecotonal effect at the same time was observed in the communities of Collembola (R u s e k , 1989) and oribatid mites (S t a r ý , in prep.), but not in testaceans (B a l í k , in prep.). The trophic structure of the nematode communities across the ecotone probably depended on interactions with other soil biota The distribution of phytophagous nematodes always reflects the distribution of the roots of higher plants. The distribution of the mycophagous and bacteriophagous nematodes probably depended on the distribution of microbial communities. The proportion of

bacteria to the total soil microflora slightly increased in the ecotonal zones 3 and 4. The proportion of actinomycetes decreased, but the fungi increased from zone 1 to zone 5 in March (K r i š t ů f e k , pers. commun.). Thus, the dominance of mycophagous nematodes reflected well the distribution of fungi across ecotone, while the relation between bacteriophagous nematodes and bacteria was not so clear. The decrease of actinomycetes in zones 1–3 corresponded with the decrease of abundance and dominance of omniphages, but no serious references exist to nematode feeding upon actinomycetes. Only C o l e m a n (1986) gives an information that "actinomycetes can serve as food for certain nematodes" referring to Morley's personal communication.

From the point of "strength of interaction" of the soil nematode communities "between adjacent ecological systems" (d i C a s t r i el al., 1988) the formation of the nematode community in zone 2 was more influenced by the meadow than by the spruce forest, and zone 4 shared many characteristics of the spruce forest nematode community. Zone 3 had evidently an intermediate character. The trophic structure of nematode community in zone 3 was similar to zones 2 and 3, the number of constant species in this zone was as low as in zones 4 and 5. As the highest diversity and density of nematodes were in zone 2, and taking in consideration their species composition, it can be concluded, that in formation of the ecotonal community of nematodes the meadow played a greater role than the spruce forest.

SUMMARY

The soil nematode communities in the meadow-spruce forest ecotone were studied in Central Bohemia. Five zones (meadow, meadow edge, outer forest edge, inner forest edge, and spruce forest) were determined for the study. A total of 92 species was found in all zones, 40 species were established in the nematode community of the spruce forest, and 57 in the meadow. The highest number of species (64) as well as the value of Shannon-Weaver index of diversity (2.97), mean abundance ($4.2 \pm 1.4 \times 10^6$ ind. m^{-2}), and mean biomass (1.67 $g.m^{-2}$) of the nematode community were found in the meadow edge. The dominance of mycophagous nematodes increased from the meadow to the spruce forest in contrary to the phytophagous ones. The dominance of bacteriophages did not show similar changes and varied from 18 to 42%. The omniphages and predators had a relatively low dominance, as well as the abundance. The similarity of nematode communities between different zones decreased from the meadow to the spruce forest. The meadow edge shared many of the characteristic species from the meadow, and the inner forest edge was very similar to the spruce forest. The nematode community of the outer forest edge had intermediate characteristics of both adjacent ecosystems. Thus, the composition of ecotonal nematode community was more affected by the meadow than by the spruce forest. The edge effect was developed on the meadow edge, and resulted in the increase of density and diversity of the soil nematode community.

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CATOPS NIKODYMI SP. N. AND NOTES ON CHOLEVINAE FROM CHINA (COLEOPTERA, LEIODIDAE)

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A b s t r a c t . *Catops nikodymi* sp. n. (from the *longulus* group) from China is described and illustrated. Further, some faunistic notes on Cholevinae from China are given.

The Chinese fauna of Cholevinae is very interesting and rich, because contains both palaearctic and oriental elements. Species from this region were included to the revisional paper of S z y m c z a k o w s k i (1964). Recently, some systematic and/or faunistic notes were added by P e r r e a u (1990) and R ů ž i č k a (1992).

In this paper, a new species of the genus *Catops* Paykull is described, and some interesting faunistic data on some species are given.

Through the text, the following abbreviations are used: CJR - author's collection; MNHNP - Muséum National d'Histoire Naturelle, Paris; NMP - National Museum, Prague.

Catops nikodymi sp. n.

(Figs 1 - 5, 11 - 14)

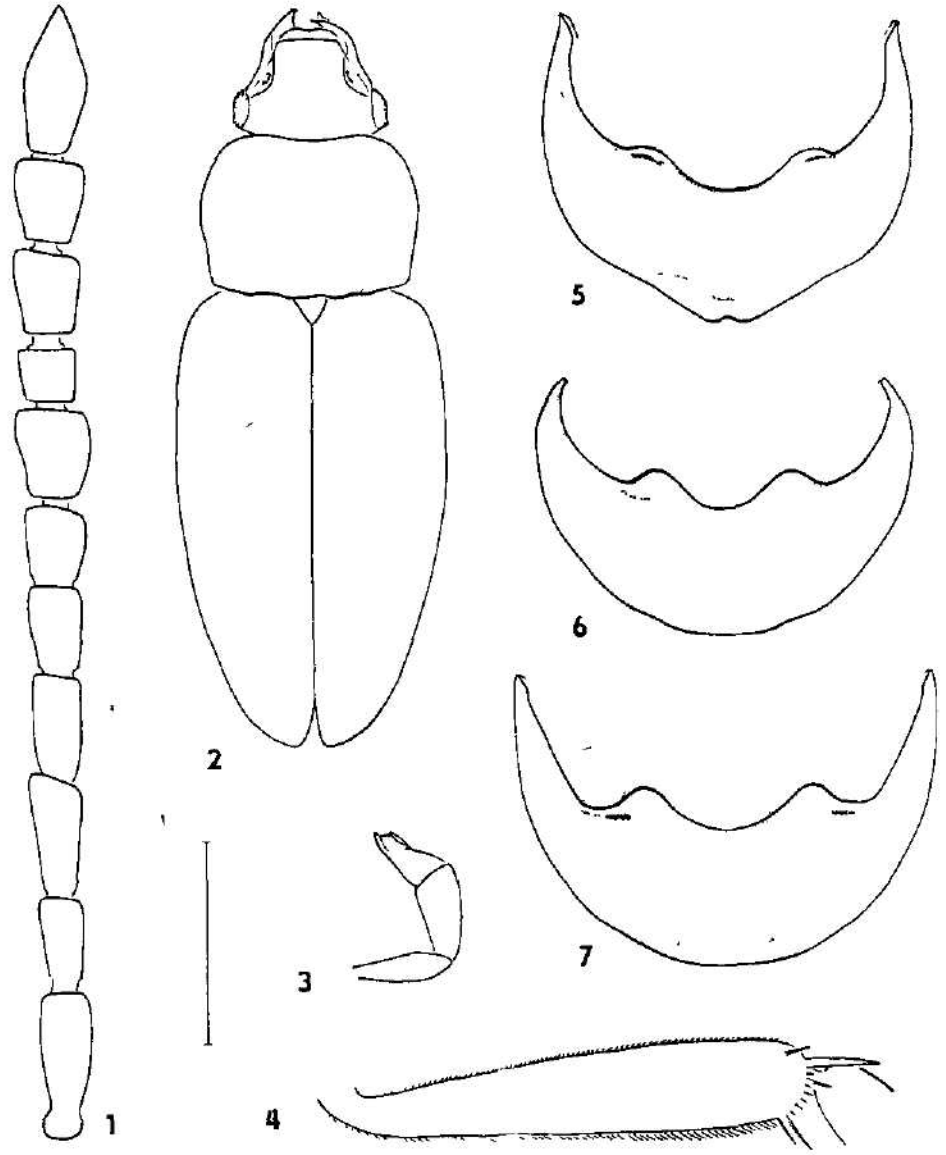
M a t e r i a l e x a m i n e d : Holotype male: China, Gansu prov., 15 km of Dogcanglhamo, 4 200 m a. s. l., 34.1°N 102.5°E, 12-15 vii. 1990, M. Nikodým lgt. Holotype is deposited in CJR.

E t y m o l o g y : the new species is named after its collector, Mr Milan Nikodým, Prague.

D e s c r i p t i o n : M a l e : Body length 5.35 mm, wings developed. Body slender (Fig. 2). Head and pronotum dark brown, elytra apically slightly lighter. Legs and mouthparts flavous, antenna brown with paler base and the ultimate segment. Body covered with short recumbent yellow pubescence.

Head 1.2 times as wide as long, surface coarsely and densely punctated, the distance between punctures equal to or slightly smaller than diameter of punctures, surface with very distinct transverse microsculpture. Eyes well developed, horisontal diameter of eye 2.5 times as wide as distance between their anterior margin and antennal insertion. Maxillary palpus with ultimate segment 1.4 times as short as penultimate segment, dorsoapically with shallow groove (Fig. 3).

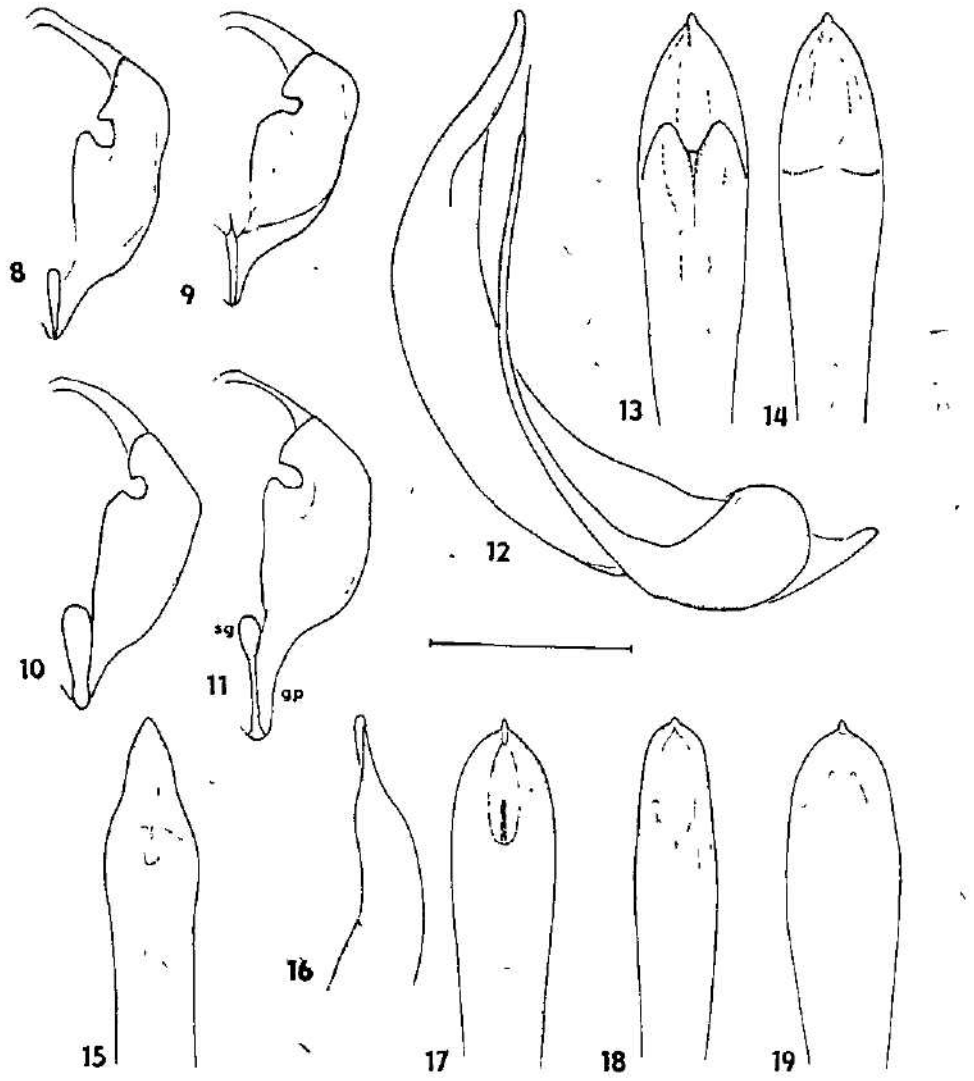
Antenna (Fig. 1) long and slender, about 1.5 times longer than pronotal width, with slightly indicated antennal club. Ratio of lengths of antennal segments (segment I equal to 1.0): 1.0 - 0.6 - 0.8 - 0.65 - 0.55 - 0.6 - 0.35 - 0.5 - 1.0. Ratio of length to width of



Figs 1-7 1-5 - *Catops mikodymi* sp n , holotype, 6 - *C gratiosus* Blanch , Crystal Cave, 1930, Barber (MNHNP), 7 - *C longulus* Kelln , Slovakia, Revucka vrchovina, 23 iv 1988, Mlejnek lgt (CJR) 1 - left antenna dorsally, 2 - habitus dorsally, 3 - right maxillary palpus dorsally, 4 - left male protibia dorsally, 5 - 7 - male abdominal sternite VIII ventrally Scale 0 5 mm for Figs 1, 3 - 7, 1 5 mm for Fig 2

segments I to XI: 2.6, 1.8, 2.25, 2.0, 1.5, 1.3, 1.1, 0.9, 1.15, 1.15, 2.2. Segment VI 1.45 times as long as segment VIII.

Pronotum 1.35 times as wide as long, 1.5 times as wide as head, flat, widest in the middle. Sides regularly rounded anteriorly, straight posteriorly, hind angle slightly blunt,



Figs 8–19 8 – *Catops ohbayashii* Jeannel, Japan, Taga-Cho (MNHNP), 16, 17 – ditto, type (MNHNP), 9, 18 – – *C. gratiosus* Blanch., Crystal Cave, 1930, Barber (MNHNP), 10, 15 – *C. longulus* Kellin, Slovakia, Revucka vrchovina, 23. iv. 1988, Mlejnek lgt. (CJR), 11–14 – *C. nikodymi* sp. n., holotype, 19 – *C. morouxae* Perreau, holotype (MNHNP). 8–11 – male genital segment ventrally, sg – spiculum gastrale, gp – genital plate, 12 – aedeagus laterally, 13 – tip of aedeagus ventrally, 14, 15, 17–19 ditto dorsally, 16 – ditto laterally. Scale 0.5 mm.

not elongated posteriorly. Hind margin of pronotum slightly sinuous. Surface punctation finer than on head; punctures round, separated, arranged in irregular transverse rows, distance between punctures greater than punctures' diameter. Surface lustrous, with fine transverse microsculpture.

Elytra slender, elongated, 1.75 times as long as wide, 2.85 times as long and 1.2 times as wide as pronotum. Tip of the elytron regularly rounded. Surface more coarsely but sparsely punctated than on pronotum, microsculpture finer than on pronotum.

Profemur simple, without protuberance ventrally. Protibia (Fig. 4) long, 5.5 times as long as maximal width, gradually extended to apex, lateral margines straight. Protarsus extended, basal segment slightly wider than apex of protibia, tarsus 2.9 times as long as the ultimate segment (without claws). Mesotibia regularly bent, 7.8 times as long as wide, as long as mesotarsus. Basal segment of mesotarsus extended. Metatibia straight, 8.9 times as long as wide, 1.1 times as long as metatarsus.

Abdominal sternites III – VII without any impressions in central parts, posterior margins simply rounded. Abdominal sternum VIII as on Fig. 5, posteriorly elongated, with distinct medial notch on posterior margin. Genital segment (Fig. 11): spiculum gastrale slender, extended posteriorly; genital plate wide, anteriorly elongated.

Aedeagus (Figs 12–14) long and slender, curved in lateral view. Apical part slightly extended in dorsal view, gradually narrowing to a slender tip with terminal tooth, dorsal part with oval impression. Apex ventrally with low central carina and longitudinal lines laterally. Ligulae oval, each with sharp longitudinal line. Parameres thin, reaching to the level of apex of ligulae, each with long terminal seta.

F e m a l e : unknown.

D i f f e r e n t i a l d i a g n o s i s : *Catops nikodymi* sp. n. belongs to the *longulus* group by simple male profemur and the characteristic shape of aedeagus (Fig. 14).

The new species differs from all species of this group (with the exception of *C. longulus* Kelln. and *C. gratiosus* (Blanch.) by the very elongate shape of body (Fig. 2); elytra 1.75 times as long as wide in *C. nikodymi* sp. n., about 1.35 – 1.5 times in the related species. From *C. longulus* and *C. gratiosus* the new species differs by the proportions of antennal segments: antennal club slightly indicated, segment VIII nearly as long as wide in *C. nikodymi* sp. n. (Fig. 1), antennal club distinct, segment VIII 1.4 – 2.0 times as wide as long in *C. longulus* and *C. gratiosus*.

The new species differs from the related species also in the following combination of characters: 1. male abdominal sternite VIII: posterior margin medially with distinct notch in *C. nikodymi* sp. n. (Fig. 5), regularly rounded in the related species (as on Figs 6,7); 2. male genital segment: anterior part of genital plate prolongated, spiculum gastrale

elongated, with broaden posterior part in *C. nikodymi* sp. n. (Fig. 11), anterior part of genital plate short, spiculum gastrale shorter, simply rounded in the related species (Figs 8 – 10); 3. shape of aedeagus: as on Fig. 14 in *C. nikodymi* sp. n., as on Figs 15, 17 – 19 in this paper, on Fig. 4 in Szymczakowski (1959), and on Figs 268, 281, 287 in Szymczakowski (1964) in the related species.

The proportions of antennal segments in *C. nikodymi* sp. n. is similar to *C. ohbayashii* Jeannel. Besides the differences given, *C. ohbayasihi* can be simply differentiated from the remaining species of the *longulus* group by the distinctly granulate surface of pronotum, only finely punctate in the remaining species.

The new species was taken in a tunnel leading to a marmot's nest, about 1–2 m from the orifice, together with *Leiodes nikodymi* and *Leiodes* sp. (Švec, 1991) and some *Aphodius* spp. (Nikodým, pers. comm.). The nest occurs on eastern slope of alpine meadow, on limestone mountain plateau.

Catops montanus Schweiger, 1956

Material examined: Nortwest. 1. China, Chinkiang (=prov. Xinjiang), 1 ♂ (coll. Hlisnikovský in NMP).

This species is probably widely distributed, known from India (Szymczakowski, 1974) and North Corea (Szymczakowski, 1976); from China previously known only from prov. Fukien (Szymczakowski, 1964).

Mesocatops imitator (Schweiger, 1956)

Material examined: China, Sichuan prov., Liziping (near Shimian), about 200 km SW of Ya'an, 2 800 – 3 000 m a. s. l., 27. vi. – 3. vii. 1991, Z. Kejval lgt., 20 spec. (CJR).

Previously known from prov. Fujian, Sichuan, Shaanxi and Yunnan in China (Szymczakowski, 1964; Růžička, 1992); probably common and widely distributed. The specimens were taken from a bird carcass in a montane primary forest.

Catopodes fuscifrons (Kraatz, 1877)

Material examined: China, Fukien, Kuatun (2 300 m), 27.40° n. Br., 117.40° ö. L., 28. i. 1938, J. Klapperich lgt., 1 ♂ (coll. Hlisnikovský in NMP); Japonia, Tokyo Umg., 18. vi. 1970, Zdeněk Hlisnikovský lgt., im Park an Maus, 1 ♀ (coll. Hlisnikovský in NMP).

The species known from sporadic finds from China, North Corea and Japan (Jeannel, 1936; Szymczakowski, 1964, 1976).

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There is my pleasant duty to thank to the following persons who gave or loaned kindly the material of Cholevinae for study: Miss Nicole Berti (MNHNP); Dr S. Bílý and Dr J. Jelínek (NMP), Ing Z. Kejval, Domažlice, and Mr M. Nikodým, Prague. I am also very indebted to Mr M. Nikodým and Ing Z. Kejval for providing me with detailed collecting data.

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NEW ORIBATID SPECIES OF THE FAMILY ORIBOTRITIIDAE (ACARI: ORIBATIDA) FROM TANZANIA

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A b s t r a c t . Three new oribatid species *Indotritia usambarensis* sp. n., *I. tropica* sp. n , and *Oribotritia africana* sp. n. are described and figured. Altogether 5 species of the superfamily Euphthiracaroidea have been recorded in Tanzania.

INTRODUCTION

Dr. K. Purrini, protozoologist and pathologist of insects working in Tanzania within the framework of the National Coconut Development Programme, sent me for determination a rich oribatid material from various parts of Tanzania. Five species of the superfamily Euphthiracaroidea were recorded. Three of them, *Indotritia usambarensis* sp. n. *I. tropica* sp. n. and *Oribotritia africana* sp. n. have been described. One species of the genus *Pocsia* M a h u n k a , 1983 was described before (S t a r ý , 1988). This is the second contribution dealing with the material of superfamily Euphthiracaroidea (Acari: Oribatida) from Tanzania, based on this material.

LIST OF LOCALITIES

TAN-001, Tanzania, Meru Krofer, 2. 4. 1985, montane tropical forest, moss and litter sample, leg. K. Purrini.
TAN-003, Tanzania, Mt. Usambara, 24. 4. 1985, 2 500m, Sphagnum sp., litter with humus from stones in a tropical wet rainforest, leg Purrini.
TAN-004, Tanzania, Mt. Usambara, 24. 4. 1985, 2 300m, tropical wet rainforest, litter sample, leg. K. Purrini
TAN-006, Tanzania, Mt. Usambara, 24. 4. 1985, 2 400m, tropical wet rainforest, decaying wood sample, leg. K. Purrini.
TAN-007, Tanzania, Kilimanjaro, 25. 6 1985, 3 800m, submontane tropical foggy forest, litter sample, leg K. Purrini.

LIST OF IDENTIFIED SPECIES

Indotritia usambarensis sp. n., localities: TAN-003 (lex.), TAN-006 (lex.),
Indotritia tropica sp. n., localities: TAN-003 (2ex.), TAN-004 (lex.),
Oribotritia africana sp. n., localities: TAN-001 (2ex.),
Rhysotritia (cf.) *comtae* Mahunka, 1983, localities: TAN-004 (2ex.), TAN-006 (2ex.),
Rhysotritia ardua (C. L. Koch, 1841), localities: TAN-001 (lex.), TAN-007 (lex.).

Indotritia usambarensis **sp. n.**
(Figs. 1A - C, 2A - B)

D i a g n o s i s : rostral and interlamellar setae short, 2 pairs of genital anal and adanal ones, upper lateral carina incomplete, setae anl, 2 and adl, 2 equal in the length.

D e s c r i p t i o n : Length of aspis 356–372 μm, breadth of aspis 282–295 μm, length of notogaster 836–905 μm, height of notogaster 675–720 μm, breadth of notogaster 640–672 μm, colour light yellow, cuticle without distinct structure.

Aspis (Fig. 1A,C) surface smooth with badly visible spots between bothridia and near insertions of lamellar setae. Two lateral carinae on each side of aspis, lower one complete, upper one incomplete, reaching approximately insertions of lamellar setae. Smooth and short rostral setae approximately equal in the length to smooth interlamellar one and 3–4 x shorter than smooth, lamellar ones. Distance between interlamellar setae longer than distance between rostral ones and 3x shorter than distance between lamellar ones Exobothridial setae fine and smooth approximately equal in the length to rostral ones Long, setiform sensillus with sharp top, 3x longer than lamellar setae, originating in oval, comparatively large bothridium. Distinct bothridial squama above bothridium.

Notogaster (Fig. 1A) globular with 14 pairs of smooth and fine notogastral setae, all surface smooth. Seta c3 the longest one on notogaster 3x longer than other notogastral ones. Other notogastral setae approximately equal in the length. Anterior part of notogaster with distinct collar, posterior part of notogaster ended by sinus terminalis (Fig. 1B). Length of cl setae approximately equal to interlamellar ones.

Anogenital region (Fig. 1B), all surface of this region smooth with 9 pairs of fine and smooth genital setae, g1-4 in anterior border of genital plates, 2 pairs of smooth adgenital ones, 2x longer than genital ones. Two pairs of very fine anal and adanal setae. Setae anl in anterior part of anal plates, an2 near ad2 in posterior part. Posterior part of anal plates very narrow.

Chelicerae (Fig. 2B), large, robust, without Trägardh's organ, with small teeth in lateral side. Comparatively long and smooth setae cha and chb, cha longer than chb Measurements of digitus fixus 235x93 μm, digitus mobilis 55x43 μm, both with 4 - 5 blunt teeth.

Palps (Fig. 2A), four segmented, chaetotactic formula 2–0–2–8(1). Seta ul 1 bifurcate Rutellum with 2 distinct incisions.

Legs, all tridactylous, leg setae were partialy destroyed.

A f f i n i t i e s : The new species belongs to the group of *Indotritia* species with short notogastral and aspal setae, but differs from this species in incomplete lateral, upper carina on aspis. *I. acanthophora* Märkell, *I. heterotricha* Mah., *I. krakatuensis* (Sell.), and *I*

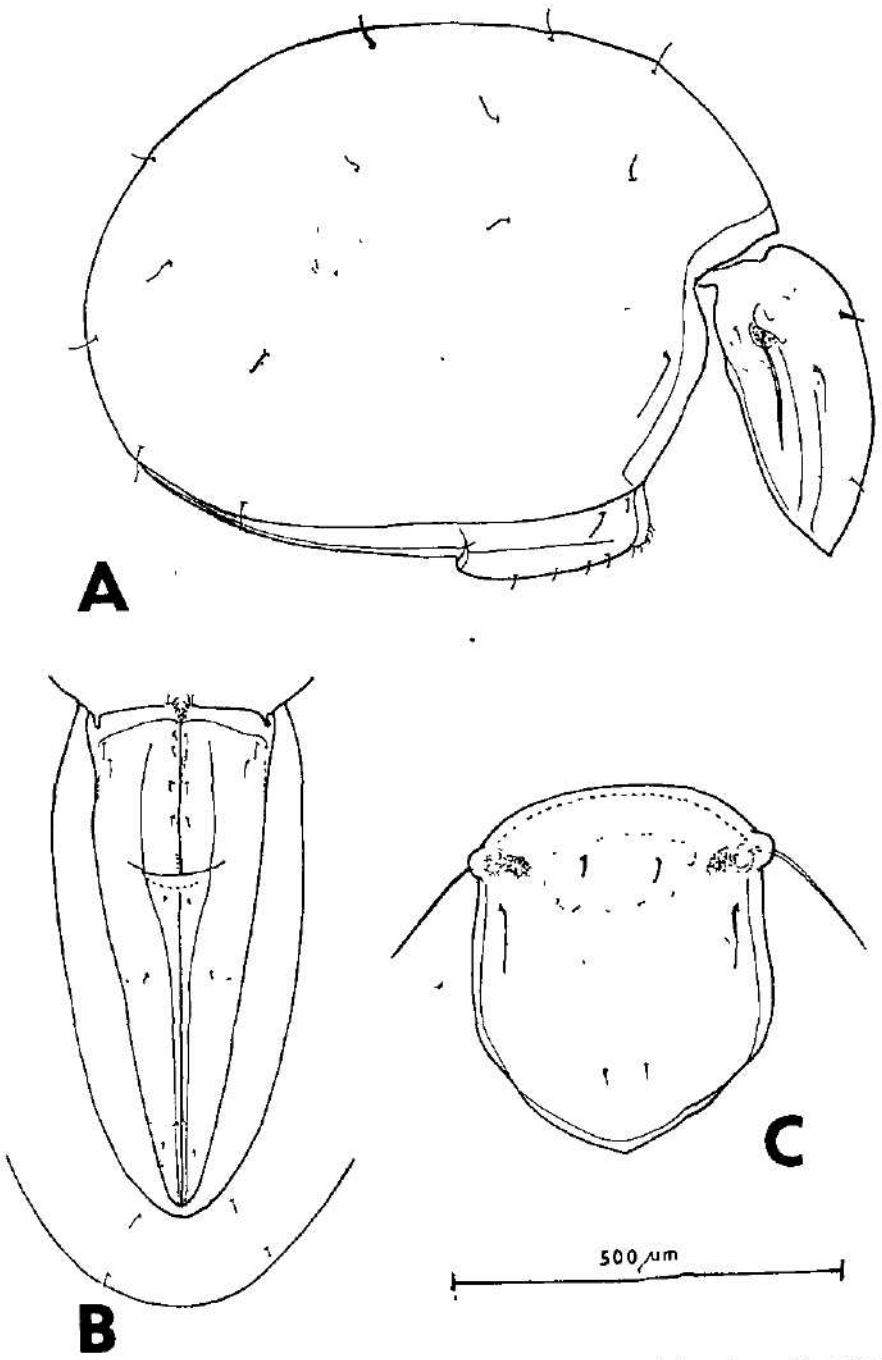

Fig 1. *Indotritia usambarensis* sp. n., A – aspis and notogaster without legs in lateral view, B – anogenital region in ventral view, C – aspis in dorsal view. Scale 500 µm.

sellnicki Aoki, differ from the new species by the presence of 3 pairs of adgenital setae and long an1 and ad1 setae. *I. consimilis* Märkell, differs by longer notogastral setae, setae an1 and ad1 are longer than an2 and ad2. (Märkell, 1964, Mahunka, 1984a, Sellnick, 1924, Aoki, 1965). *I. aotearana* Ramsay differs by the presence of only one lateral carina on aspis, and by the presence of 3 pairs of adanal setae and absence of anal setae (Ramsay, 1966).

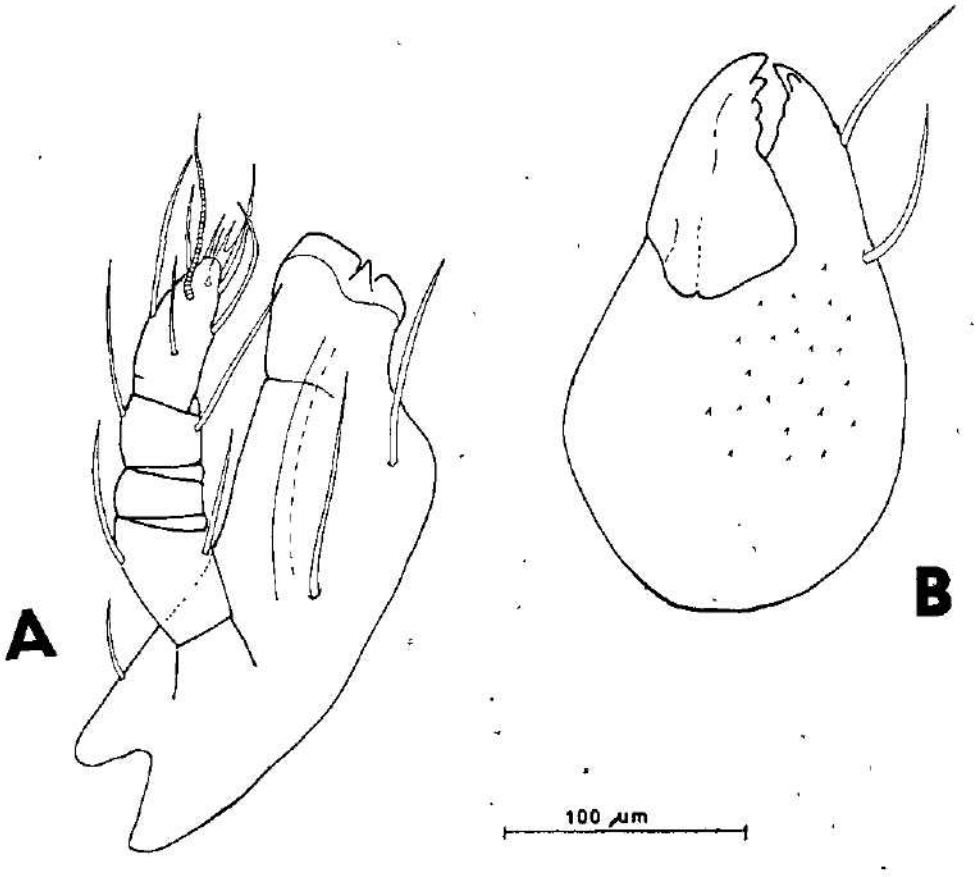

Fig. 2. *Indotritia usambarensis* sp. n., A – right palp with rutelum in ventral view, B – Chelicera in lateral view. Scale 100 µm

Locus typicus. Tanzania, Mt Usambara, 24 4 1985, 2500m, *Sphagnum* sp., litter with humus from the stones in a tropical wet rainforest

Types: Holotypus (Ho-24. 4 1985-TAN-003) in ethanol, and one paratypus in slide are deposited in the author's collection in the Institute of Soil Biology, Czechoslovak Academy of Sciences, České Budějovice.

Indotritia tropica **sp. n.**
(Figs. 3A – C, 4A – B)

D i a g n o s i s : Two lateral carinae on aspis, long setiform sensillus, genitoadgenital sutura bent inward, two pairs of anal and adanal setae present, seta ad2 2x longer than ad1.

D e s c r i p t i o n : Length of aspis 295–319 μm, breadth of aspis 282–310 μm, length of notogaster 612–648 μm, height of notogaster 496–529 μm, breadth of notogaster 452–470 μm. Cuticle smooth without distinct structures, colour light yellow.

Aspis (Fig. 3A,C) smooth, with weak striation on anterior part around rostral setae. Two complete lateral carinae on each side of aspis. Smooth and strong interlamellar setae erected, approximately 2x longer than rostral ones, and 2,5x shorter than lamellar ones. Long setiform and smooth sensillus with sharp top, longer than lamellar setae. Bothridial squama situated above bothridium. Exobothridial setae not visible.

Notogaster (Fig. 3A) globular, smooth, with 14 pairs of strong, smooth and erected notogastral setae, bending forward. Setae c3 the longest notogastral setae, but 2x shorter than sensillus. Distinct collar present in anterior margin of notogaster. Seta c1 not reaching to anterior border of notogaster.

Anogenital region (Fig. 3B) with 8 pairs of fine genital setae, g1–4 situated on anterior border, two pairs of fine adgenital setae distinctly longer than genital ones. Seta ag1 2x shorter than ag2. Two pairs of very short and fine anal setae, 2 pairs of adanal ones, seta ad 2 distinctly longer than ad1. Genito-adgenital suturae bent inward, all surface smooth.

Chelicerae (Fig. 4B) robust, without distinct Trägardh's organ, with small lateral teeth on surface. Long and smooth cha and chb setae. Measurements of digitus fixus 205x82 μm, and digitus mobilis 48x35 μm, both with four teeth.

Palps (Fig. 4A) four-segmented, chaetotactic formula 2-0-2-8(1) with bifurcate ul 1 seta. Rutellum with two distinct incisions.

Legs, all tridactylous, leg setae were destroyed during preparation.

A f f i n i t i e s : New species belongs to the *Indotritia* species group with comparatively strong, erected and long notogastral and aspal setae. The nearest related species is *I. septemtrionalis* Mahunka, but it differs from the new species by the presence of 9 pairs of genital setae, fine ciliated notogastral setae and longer lamellar ones. Seta c1 is equal in the length to interlamellar ones *(I tropica* sp. n. has c1 shorter than interlamellar ones), (M a h u n k a , 1987b). All other species of this group differ by the presence of only one pair of anal setae. *I. africana* Mahunka, and *I. hawaiiensis* (Jacot) have only one lateral carina on each side of aspis, *I. undulata* Bayoumi, Mahunka has sculptured surface of notogaster (M a h u n k a , 1984b, J a c o t , 1934). *I. completa* has genitoadgenital suture bent inward too, but it differs from the new species by the presence of 9 pairs of genital and I pair of anal setae and no differences between length of adanal setae (M a - h u n k a , 1987a).

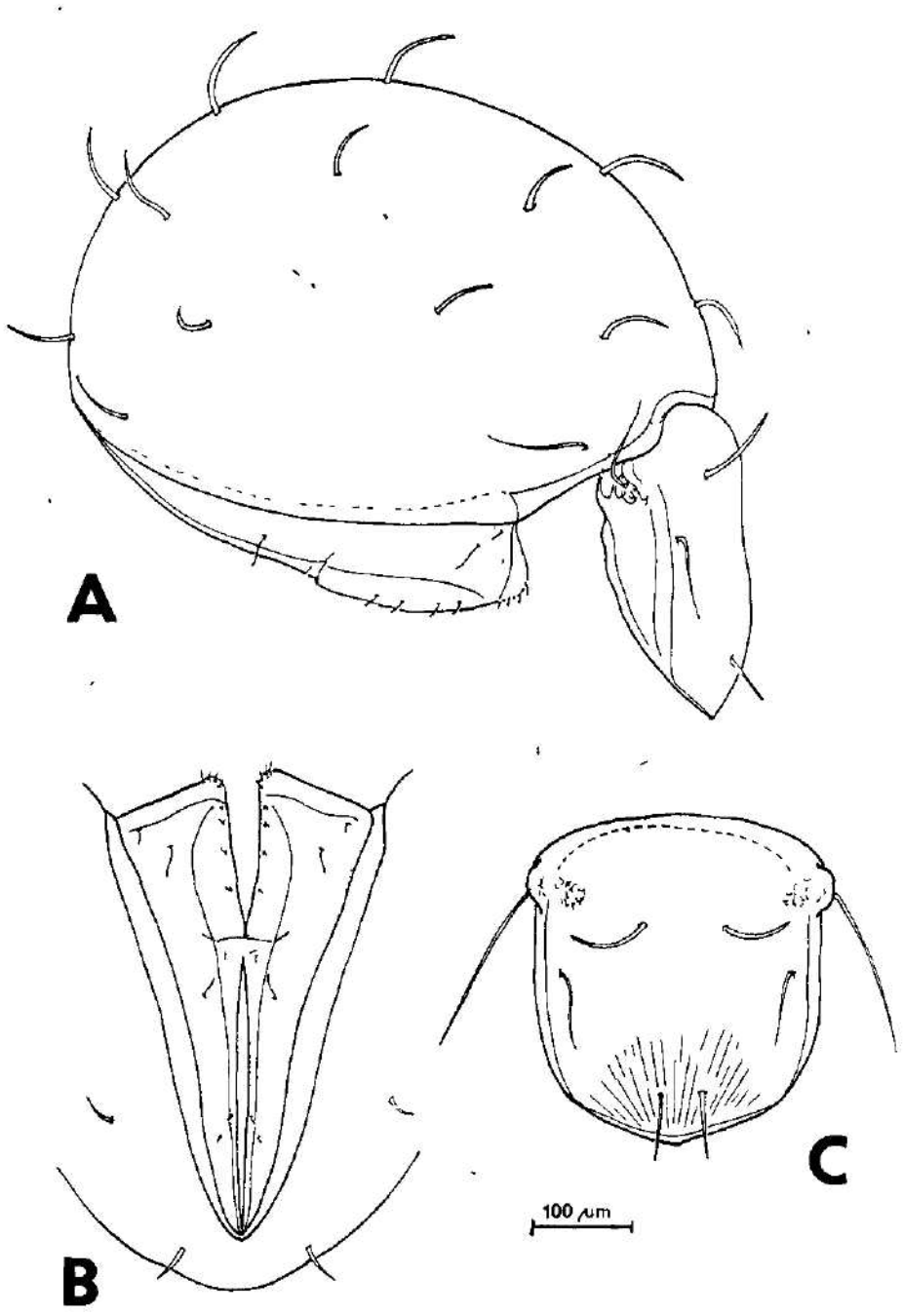

Fig 3 *Indotritia tropica* sp n , A – aspis and notogaster without legs in lateral view, B – anogenital region in ventral view, C – aspis in dorsal view Scale 100 µm.

L o c u s t y p i c u s Tanzania, Mt Usambara, 24 4 1985, 2500m, *Sphagnum* sp , litter with humus from stones in tropical wet rainforest, leg K Purrini

T y p e s Holotypus (Ho-24 4 1985-TAN-003) and one paratypus in ethanol, one paratypus in slide, are deposited in the author's collection in the Institute of Soil Biology, Czechoslovak Academy of Sciences, Česke Budějovice

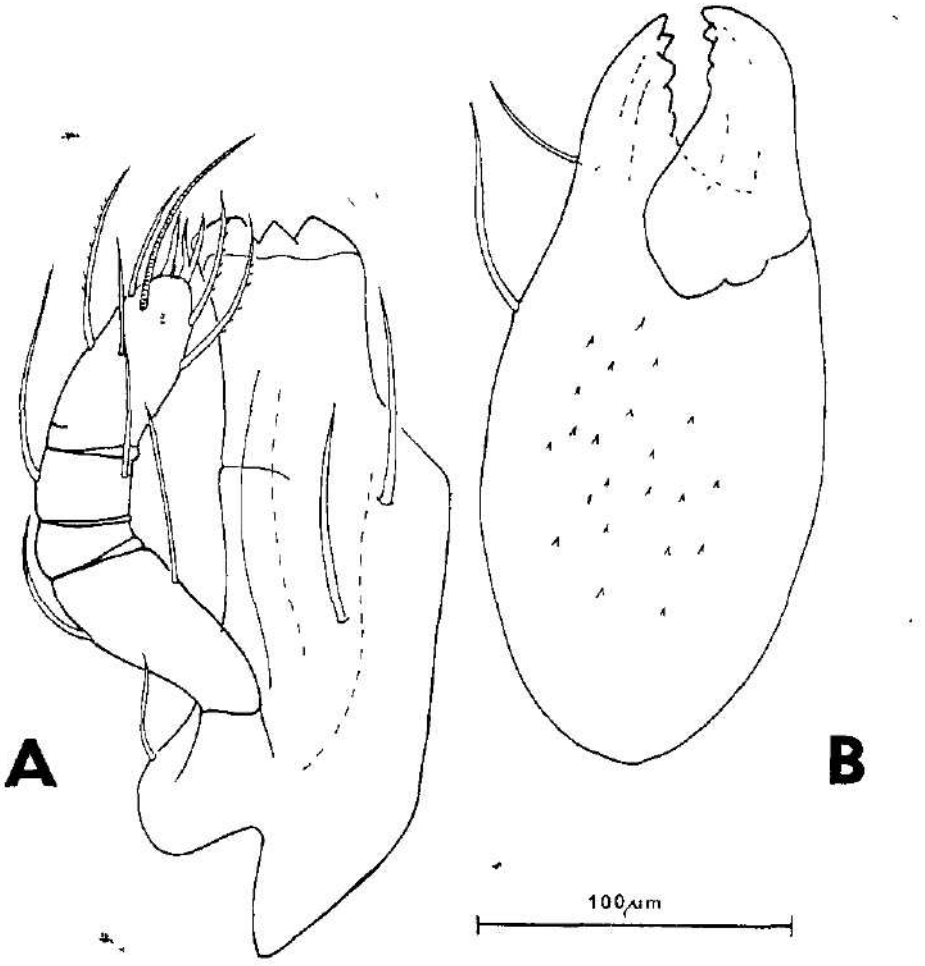

Fig. 4. ***Indotritia tropica*** **sp. n., A – right palp with rutelum in ventral view, B – chelicera in lateral view Scale 100 µm.**

Oribotritia africana **sp. n.**

(Figs 5A – C, 6A – B)

D i a g n o s i s . two lateral carinae on aspis, long setiform and smooth sensillus, presence of 9 pairs of genital, 2 pairs of adgenital, anal and adanal setae

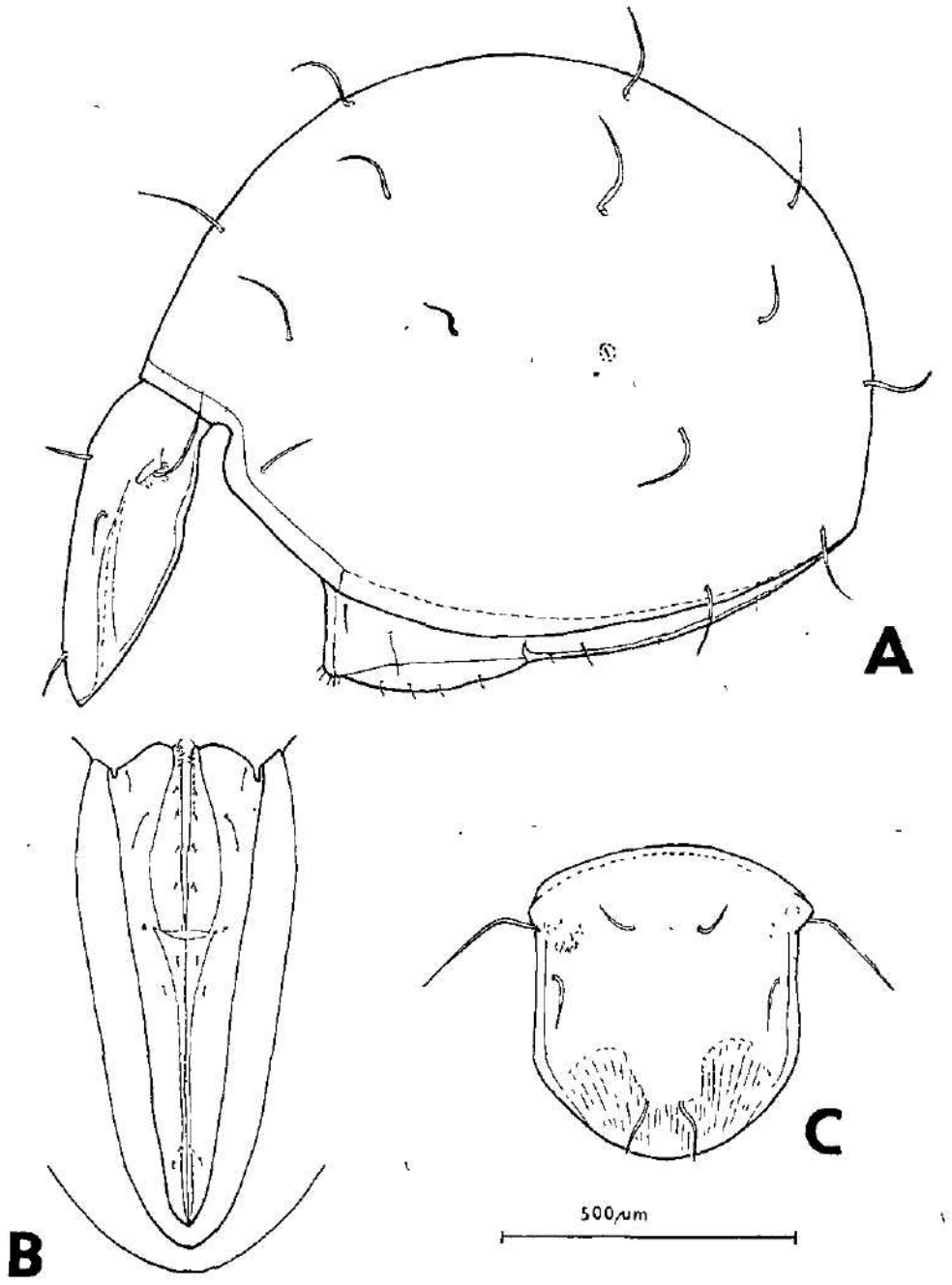

Fig. 5 *Oribotritia africana* sp. n., A – aspis and notogaster in lateral view, B – anogenital region in ventral view, C – aspis in dorsal view. Scale 500 µm.

Description: Lenght of aspis 563–580 μm, breadth of aspis 492–505 μm, length of notogaster 1203–1280 μm, height of notogaster 1015–1034 μm, breadth of notogaster 952–980μm. Cuticle light yellow, smooth, without thick layer of cerotegument and distinct sculpturae.

Aspis (Fig. 5A, C) smooth, with weak striation on anterior part. Two lateral carinae on each side of aspis. Setae of the aspis comparatively short, smooth and strong, approximately equal in the length. Distance between interlamellar setae 2x longer than distance between rostral ones and more than 3x shorter than distance between lamellar ones. Setiform sensillus comparatively long and smooth with sharp top, approximately 2x longer than lamellar setae. Interlamellar and rostral ones erected, lamellar ones decumbent. Distinct rim on margin of aspis. Bothridial squama situated above comparatively small bothridium.

Notogaster (Fig. 5A) globular, smooth, with 14 pairs of smooth setae, bent forward, and approximately equal in the length. Seta c1 longer than interlamellar one. Distinct collar on anterior, and sinus terminalis on posterior part of notogaster.

Anogenital region (Fig. 5B) with 9 pairs of genital, 2 pairs of adgenital, anal, and adanal setae. All genital, adanal and anal setae very short, fine and smooth, approximately equal in

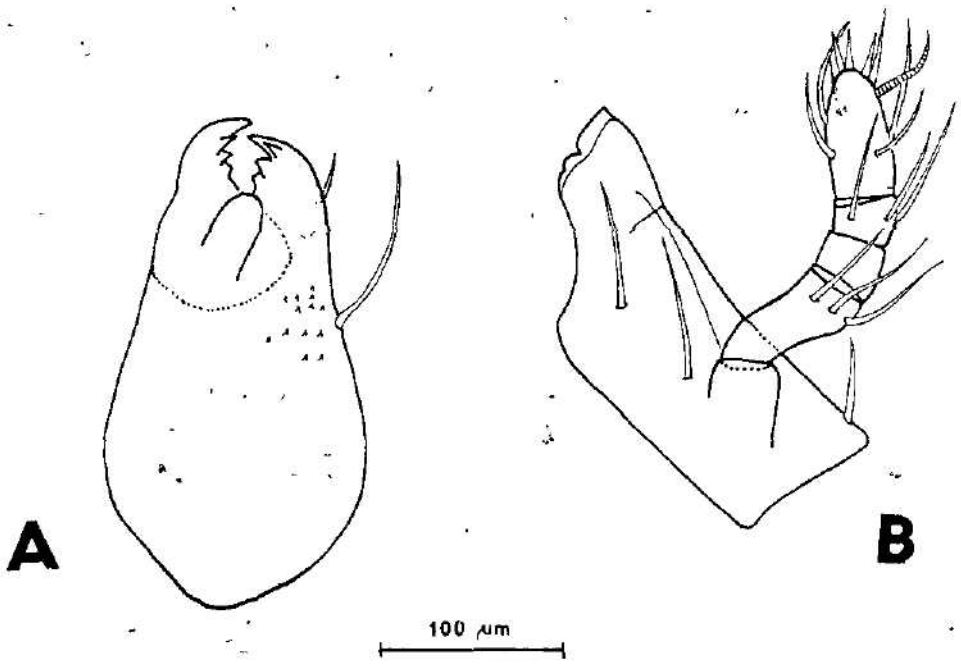

Fig. 6. *Ontbotritia africana* sp. n., A – chelicera in lateral view, B – left palp with rutelum in ventral view. Scale 100 μm.

the length, 3–4x shorter than smooth adgenital ones. Seta ag2 distinctly longer than ag1. Setae g1–4 situated on the anterior part of genital plates, anal plates very narrow.

Chelicerae (Fig. 6A) robust, with distinct Trägardh's organ with blunt top. Some small teeth on lateral side of digitus fixus. Long setae cha 2x longer than chb. Measurements of digitus fixus 268x143 μm, digitus mobilis 108x76 μm, both with 4 sharp teeth.

Palps (Fig. 6B) five segmented, chaetotactic formula 0-3-0-3-9(1), comparatively small rutellum with incisions on the top.

Legs, all with three claves.

A f f i n i t i e s : Only *Oribotritia hauseri* Mah., and *O. angusta* Mah. have two lateral carinae on each side of aspis (M a h u n k a , 1982a, b), but *O. hauseri* Mah. differs from the new species by presence of 1 pair of anal and 3 pairs of adanal setae, and by lanceolate and finely dentate sensillus. *O. angusta* Mah. differs by the presence of 8 pairs of genital, 3 pairs of anal, and adanal setae, and by short sensillus. New species differs from other congeners by the presence of 2 pairs of anal and, adanal setae.

L o c u s t y p i c u s : Tanzania, Meru Krofer, 2. 4. 1985, montane tropical forest, moss and litter sample, leg. K. Purrini.

T y p e s : Holotypus (Ho-2. 4. 1985-TAN-001) *in* ethanol, and one paratypus in slide are deposited *in the* author's collection in the Institute of Soil Biology, Czechoslovak Academy of Sciences, Ćeske Budėjovice.

A c k n o w l e d g e m e n t s

I thank to Dr K. Purrini for the material of oribatids from Tanzania, to Dr J. Rusek DrSc. for reading the manuscript and to Dr J. Jirák for his help with English translation.

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NEW SPECIES OF THE GENUS EUPHTHIRACARUS (ACARI: ORIBATIDA) FROM VIETNAM

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A b s t r a c t . Two new species *Euphthiracarus vietnamicus* sp. n. and E. *labyrinthicus* sp. n. are described and figured. Six other species of the superfamily Euphthiracaroidea are recorded.

INTRODUCTION

In autumn 1988 I visited some localities in Northern Vietnam. This area is very interesting from faunistic and zoological aspects. It is situated near the boundary of Palaearctic and Oriental region. For example, fauna of Lepidoptera is typically oriental in part with low elevation above the sea level, but number of Palaearctic elements increases in highland with higher elevation (S p i t z e r , personal communication). I have studied fauna of oribatid mites in Tam Đao, where I have collected a large material of soil samples from arable soils to primary foggy forest ones. Oribatid fauna of this interesting place has been studied by M a h u n k a (1987) recently. This comparatively large material of soil mites has contained two new species of the genus *Euphthiracarus*, which are described in this contribution.

LIST OF LOCALITIES

VIE-27, Vietnam, Tam Dao, 12. 10. 1988, 1 000 m, sample of moss on stone step, leg. J. Starý.
VIE-26, Vietnam, Tam Dao, 12. 10. 1988, 1 000 m, moss sample on the stone step, leg. J. Starý.
VIE-37, Vietnam, Tam Dao, 12. 10. 1988, 1 250 m, primary foggy forest, litter soil sample, leg. J. Starý.
VIE-39, Vietnam, Tam Dao, 12. 10. 1988, 1 250 m, primary tropical foggy forest, litter sample, leg. J. Starý.
VIE-45, Vietnam, Tam Dao, 12. 10. 1988, 1 200 m, primary tropical foggy forest, decaying, wood sample, leg. J. Starý.
VIE-69, Vietnam, Tam Dao, 13. 10. 1988, 1 000 m, isolated semideciduous, tree, ephifytic fern on high 3 m, rhizosphere sample, leg. J. Starý.
VIE-73, Vietnam, Tam Dao, 13. 10. 1988, 900 m, tropical wet forest at the foot of the waterfall, litter sample, leg. J. Starý.
VIE-76, Vietnam, Tam Dao, 13. 10. 1988, 900 m, tropical wet forest, at the foot of the waterfall, ephifytic orchid on high 5 m, rhizosphere sample, leg. J. Starý.
VIE-80, Vietnam, Tam Dao, 13. 10. 1988, 900 m, tropical wet forest at the foot of the waterfall, wet moss and soil sample from slot of the rock, leg. J. Starý.
VIE-83, Vietnam, Tam Dao, 13. 10. 1988, 950 m, tropical rain forest, litter sample, leg. J. Starý.
VIE-92, Vietnam, Tam Dao, 15. 10. 1988, 1 080 m, secondary tropical foggy forest, litter sample, leg. J. Starý.
VIE-94, Vietnam, Tam Dao, 15. 10. 1988, 1 100 m, secondary tropical foggy forest, litter sample, leg. J. Starý.
VIE-96, Vietnam, Tam Dao, 15. 10. 1988, 1 050 m, grassland, soil sample, leg. J. Starý.
VIE-102, Vietnam, Tam Dao, 15. 10. 1988, 879 m, tropical rain forest, at the foot of the waterfall, top of the rock, litter sample, leg. J. Starý.
VIE-106, Vietnam, Tam Dao, 16. 10. 1988, 1 150 m, tropical foggy forest, moss saple on the soil, leg. J. Starý.
VIE-110, Vietnam Tam Dao, 16. 10. 1988, 1 100 m, litter sample, on stone step, leg. J. Stary.
VIE-114, Vietnam, Tam Dao, 16. 10. 1988, 1 200 m, primary foggy forest, litter sample, leg. J. Starý.

VIE-115, Vietnam, Tam Dao, 16 10. 1988, 1 250 m, primary foggy forest, litter sample, leg. J. Stary.
VIE-118, Vietnam, Tam Dao, 16. 10. 1988, 1 000 m, agrobiocenose, orange orchard with orange tree, litter sample, leg. J. Stary.
VIE-120, Vietnam, Tam Dao, 16 10. 1988, 1 000 m, agrobiocenose, sample of moss on the orange tree, leg J. Stary.
VIE-121, Vietnam, Tam Dao, 17. 10. 1988, antropocenose, moss on the stone wall, leg. J. Stary.
VIE-130, Vietnam, Tam Dao, 17 10. 1988, 980 m, antropocenose, solitery *Pinus* sp. tree, moss, grass and litter sample, leg. J. Stary.
VIE-145, Vietnam, Tam Dao, 18. 10. 1988, 1 300 m, primary foggy forest, litter sample, leg. J. Stary.
VIE-153, Vietnam, Tam Dao, 18. 10. 1988, 1 250 m, primary foggy forest, litter sample, leg. J. Stary.
VIE-165, Vietnam, Tam Dao, 18. 10. 1988, 1 350 m, primary foggy forest, litter sample, leg. J. Stary.
VIE-171, Vietnam, Tam Dao, 19. 10. 1988, 1 050 m, secondary *Pinus* sp forest, litter sample, leg J. Stary.
VIE-173, Vietnam, Tam Dao, 19. 10. 1988, 1 050 m, secondary *Pinus* sp. forest, litter sample, leg. J. Stary.
VIE-176, Vietnam Tam Dao, 19. 10. 1988, 1 100 m, secondary *Pinus* sp forest, litter sample, leg. J. Stary.
VIE-183, Vietnam, Tam Dao, 20. 10. 1988, 1 300 m, primary foggy forest, litter sample, leg. J. Stary.
VIE-184, Vietnam, Tam Dao, 20. 10. 1988, 1 250 m, primary foggy forest, litter and soil sample, leg. J. Stary.
VIE-185, Vietnam, Tam Dao, 20. 10. 1988, 1 250 m, primary foggy forest, litter sample, leg. J. Stary.
VIE-186, Vietnam, Tam Dao, 20. 10. 1988, 1 200 m, primary foggy forest, litter sample, leg. J. Stary.
VIE-189, Vietnam, Tam Dao, 20. 10. 1988, 1 200 m, primary foggy forest, litter sample, leg. J. Stary.
VIE-190, Vietnam, Tam Dao, 20. 10. 1988, 1 180 m, primary foggy forest, litter and soil sample, leg. J. Stary.
VIE-191, Vietnam, Tam Dao, 20 10. 1988, 1 150 m, primary foggy forest, litter and soil sample, leg. J. Stary.
VIE-192, Vietnam, Tam Dao, 20 10. 1988, 1 130 m, secondary foggy forest, litter and soil sample, leg. J. Stary.
VIE-193, Vietnam, Tam Dao, 20 10. 1988, 1 150 m, secondary foggy forest, litter sample, leg. J Stary.
VIE-194, Vietnam, Tam Dao, 20 10. 1988, 1 050 m, secondary foggy forest, litter sample, leg. J. Stary.
VIE-197, Vietnam, Tam Dao, 20. 10. 1988, 1 050 m, secondary foggy forest, litter, moss and soil sample, leg. J. Stary.

LIST OF IDENTIFIED SPECIES

Microtritia tropica Märkell, 1964 – locality: VIE-130 (1ex.),

Indotritia javensis (Sellnick, 1923) – localities: VIE-153 (2ex.), VIE-115 (1ex.), VIE-183 (3ex.),

Mesotritia spinosa Aoki, 1980 – locality: VIE-171 (2ex),

Indotritia completa Mahunka, 1988 – localities: VIE-176 (1ex.), VIE-192 (1ex.), VIE-194 (3ex.),

Euphthiracarus vietnamicus sp. n. – locality: VIE-45 (1ex.),

Euphthiracarus labyrinthicus sp. n. – locality: VIE-165 (1ex.),

Rhysotritia cf. *ardua otabeitensis* Hammer, 1972 – localities: VIE- 39 (1ex.), VIE-80 (1ex.), VIE-121 (1ex.), VIE-186 (1ex.), VIE-191 (1ex.),

Rhysotritia cf. *rasile* Mahunka, 1982 – localities: VIE-26 (1ex.), VIE-27 (1ex.), VIE-37 (1ex.), VIE-69 (1ex.), VIE-73 (1ex.), VIE-76 (4ex.), VIE-83 (3ex.), VIE-92 (4ex.), VIE-94 (1ex), VIE-96 (2ex.), VIE-102 (1ex.), VIE-110 (1ex.), VIE-118 (6ex.), VIE-120 (1ex.), VIE-184 (3ex.), VIE-185 (1ex.), VIE-189 (4ex.), VIE-190 (3ex.), VIE-191 (2ex.), VIE-192 (2ex.), VIE-197 (3ex.).

Euphthiracarus vietnamicus **sp. n.**
(Figs. 1A-C, 2A-C, 3A-D)

D i a g n o s i s : sensillus clavate with many teeth on the blunt top, very long notogastral setae C row, all surface of body with a small tenuous foveolae.

D e s c r i p t i o n : Lenght of aspis 303 μm, breadth of aspis 225 μm length of notogaster 558 μm, width of notogaster 437 μm, breadth of notogaster 420 μm. Colour dull ochre yellow.

Aspis (Fig. 1A, C) comparatively narrow, with two lateral carinae on each side of the aspis. Strong, erect and roughed in distal part lamellar setae shorter than strong roughed interlamellar ones and longer than smooth rostral ones bent on the top. Whole surface of aspis with small tenuous foveolae. Short and clavate sensillus with very short clavus, with many fine teeth on distal blunt part. Comparatively large bothridial squama situated bellow small bothridium. Distance between insertions of rostral setae longer than distance between lamellar ones and shorter than distance between interlamellar ones. Lamellar setae situated in central part of aspis.

Notogaster (Fig. 1A) oval, convex with small and tenuous foveolae and with 14 pairs of erected notogastral setae roughed in distal third. Seta cp the longest and d1 the shortest notogastral one. Setae C row distinctly longer than other notogastral ones, setae c1 reaching anterior notogastral margin and insertions of setae d1, too. Seta d1 3x shorter than c1 and 2x shorter than e1. Anterior margin with distinct collar, posterior part of notogaster with long fissura terminalis (Fig. 2C).

Anogenital region (Fig. 1B): surface of this region with small, oval and tenuous foveolae, comparatively large first interlocking triangle situated in central part, small second one in posterior part of this region. 9–10 pairs of fine and smooth genital setae, g1-4 on anterior border shorter than other genital ones g5-10, seta ag2 distinctly longer than the genital ones. Three pairs of anal and 3 pairs of adanal setae, seta ad1 and ad2 crooked, other anal and adanal setae straight.

Chelicerae (Fig. 2B) robust and wide, with distinct Trägardh's organ blunt on the top, surface with small teeth, seta chb and cha smooth equal in the length. Measurements of digitus fixus 193x111 μm, digitus mobilis 77x49 μm, digitus fixus with 5 and digitus mobilis with 3 teeth.

Palps (Fig. 2A) three segmented, rutellum with one distinct incision, chaetotactic formula 2-2-8(1).

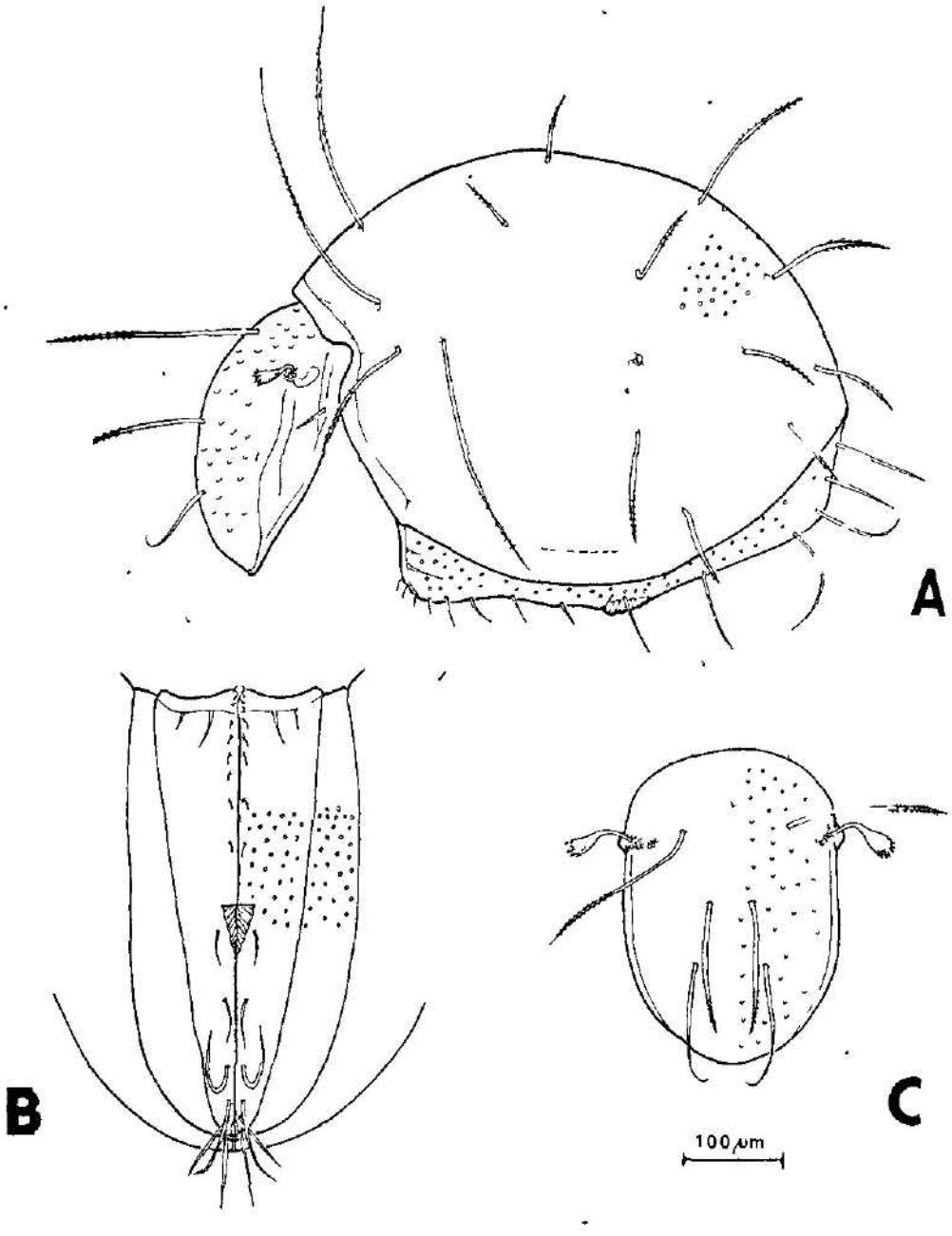

Fig 1 *Euphthiracarus vietnamicus* sp n , A – aspis and notogaster without legs in lateral view, B – anogenital region in ventral view, C – aspis in dorsal view Scale 100 µm

Legs (Fig 3A-D) robust, all tridactylous, leg chaetotactic formulae I - 0-2-4(2)-4(2)-12(3)-3, II 1-3-3(1)-5(1)-12(2)-3, III 2-2-2(1)-3-10-3, IV 2-1-1(1)-2(1)-9-3 Solenidia ω_1 and φ_1, δ_1 on the leg I, ω_{1-2} on the leg II without, others with accompanying setae

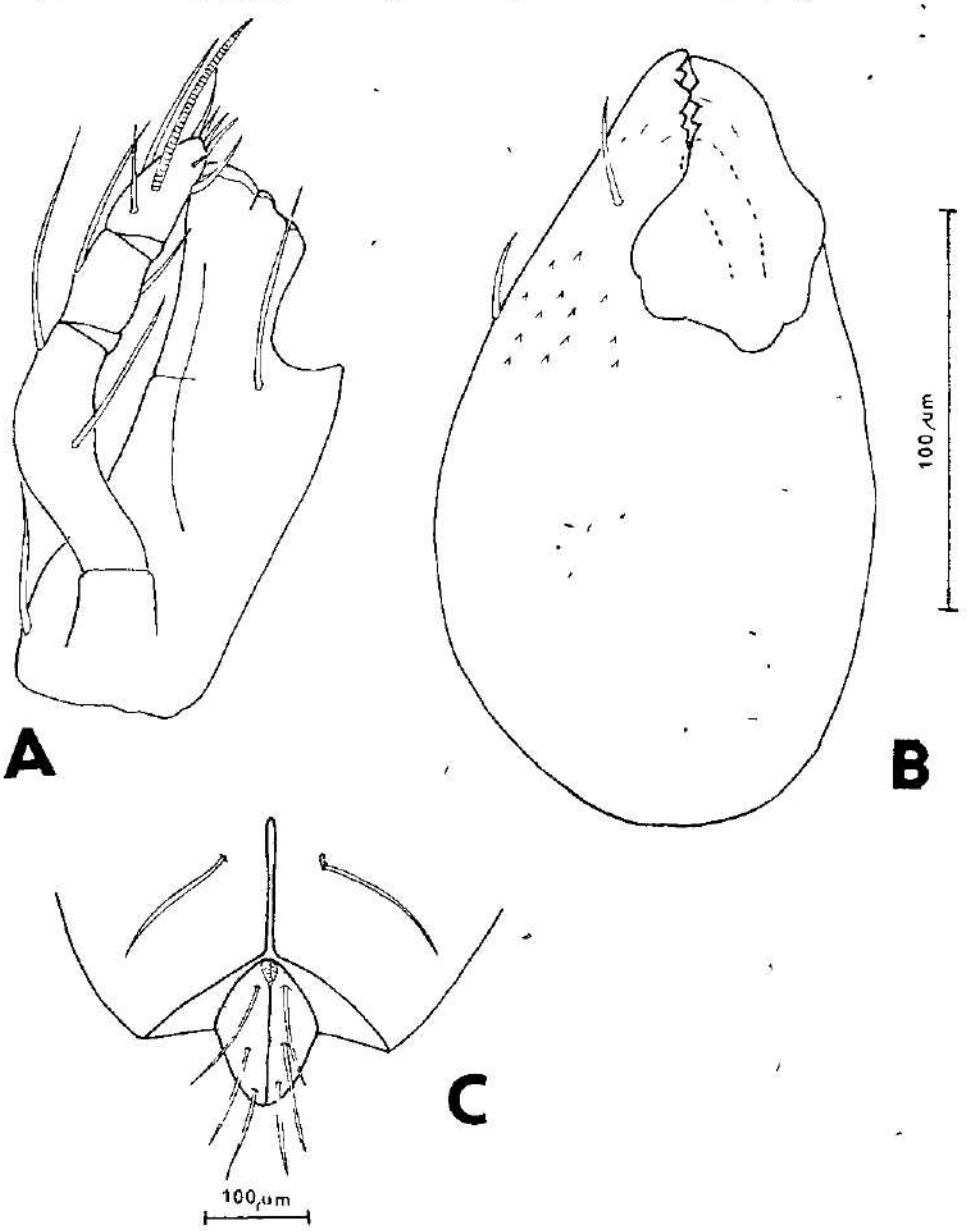

Fig 2 *Euphthiracarus vietnamicus* sp n , A – right palp and rutellum in ventral view, B – left chelicera in lateral view, C – posterior part of notogaster Scale 100 µm

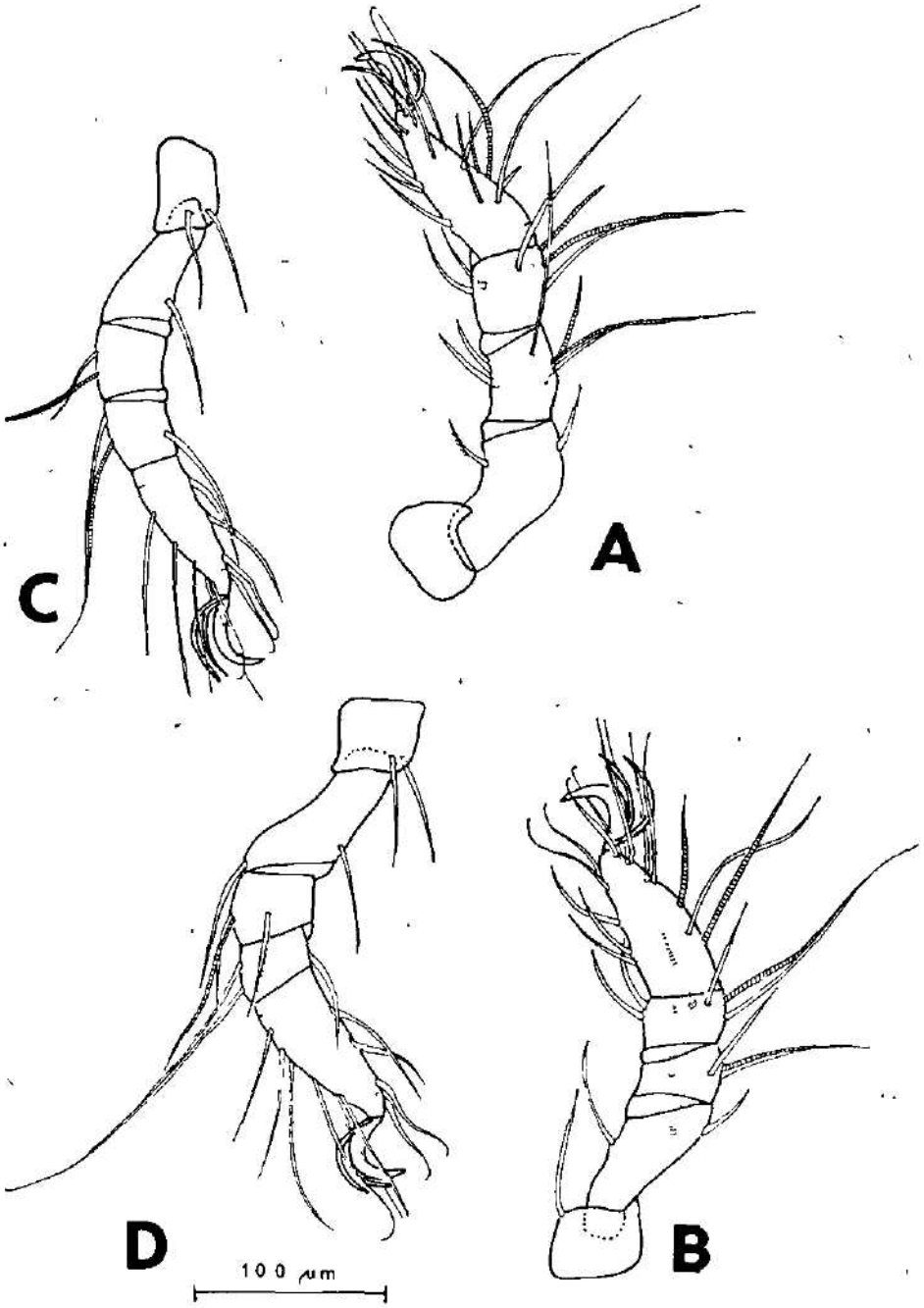

Fig. 3. *Euphthiracarus vietnamicus* sp. n., A – left leg I in antiaxial view, B – left leg II in antiaxial view, C – left leg III in paraxial view, D – left leg IV in paraxial view Scale 100 µm.

A f f i n i t i e s : The new species belongs to *Euphthiracarus* species group with clavate sensillus and tridactyous legs. Extremely long setae of C row are a unique feature in genus *Euphthiracarus*. Besides this feature, *E. polystretos* Walker differs by longer sensillus and shorter aspal and notogastral setae (W a l k e r , 1964). *E. oveolatus* Aoki has larger foveolae, longer sensillus and shorter notogastral setae. *E. takahashi* Aoki has shorter aspal and notogastral setae and longer sensillus and genital setae (A o k i , 1980). *E. punctulatus* Jacot has smooth surface of aspis (J a c o t , 1930).

L o c u s t y p i c u s : Vietnam, Tam Dao, 12. 10. 1988, 1 200 m, primary tropical foggy forest, decaying wood sample, leg. J. Stary.

T y p e s : Holotypus (Ho-12. 10. 1988-VIE-45) in slide is deposited in the author's collection in the Institute of Soil Biology, Czechoslovak Academy of Sciences, České Budějovice.

Euphthiracarus labyrinthicus sp. n.

(Figs. 4A-C, 5A-C, 6A-D)

D i a g n o s i s : surface of notogaster with small, oval and dense foveolae, labyrinthical sculpture on the surface of anogenital region, irregular foveolae in posterior part of aspis, sensillus with roughed slender clavus.

D e s c r i p t i o n : Length of apis 259 μm, breadth of aspis 184 μm, length of notogaster 462 μm, width of notogaster 353 μm, breadth of notogaster 337 μm. Colour yellowish brown.

Aspis (Fig. 4A, C) surface of posterior part of aspis and part between bothridia with irregular foveolae, the rest of the surface with dense points. All setae on aspis smooth and erect, strong interlamellar setae 1,5x longer than lamellar ones and 2x longer than rostral ones. Rostral setae hook-shaped on the top. Distance between lamellar setae approximately equal to rostral one and 2,5x shorter than interlamellar ones. Exobothridial setae fine, two lateral carinae on each side of aspis, the first complete and the second uncomplete. Comparatively long sensillus with slender clavus, roughed on the top, longer than lamellar setae, but shorter than interlamellar ones. Small bothridial squama situated under small bothridium.

Notogaster (Fig. 4A) oval, comparatively wide, with 14 pairs of small and erect setae. Seta c1 not reaching to anterior margin of notogaster and insertion point of seta d1. Surface of notogaster with small, oval, regular, and dense foveolae. Anterior margin of notogaster with slender collar and posterior part with long fissura terminalis.

Anogenital region (Fig. 4B) surface with specifical labyrinthical sculpturae, 9 pairs of fine genital setae, g1-4 shorter, situated on anterior border. Two pairs of adgenital setae, seta ag2 3x longer than genital ones and ag1 approximately equal in the length to genital ones. Three pairs of long and strong anal and adanal setae. First interlocking triangle in the middle part and a small second one in the posterior part of this region.

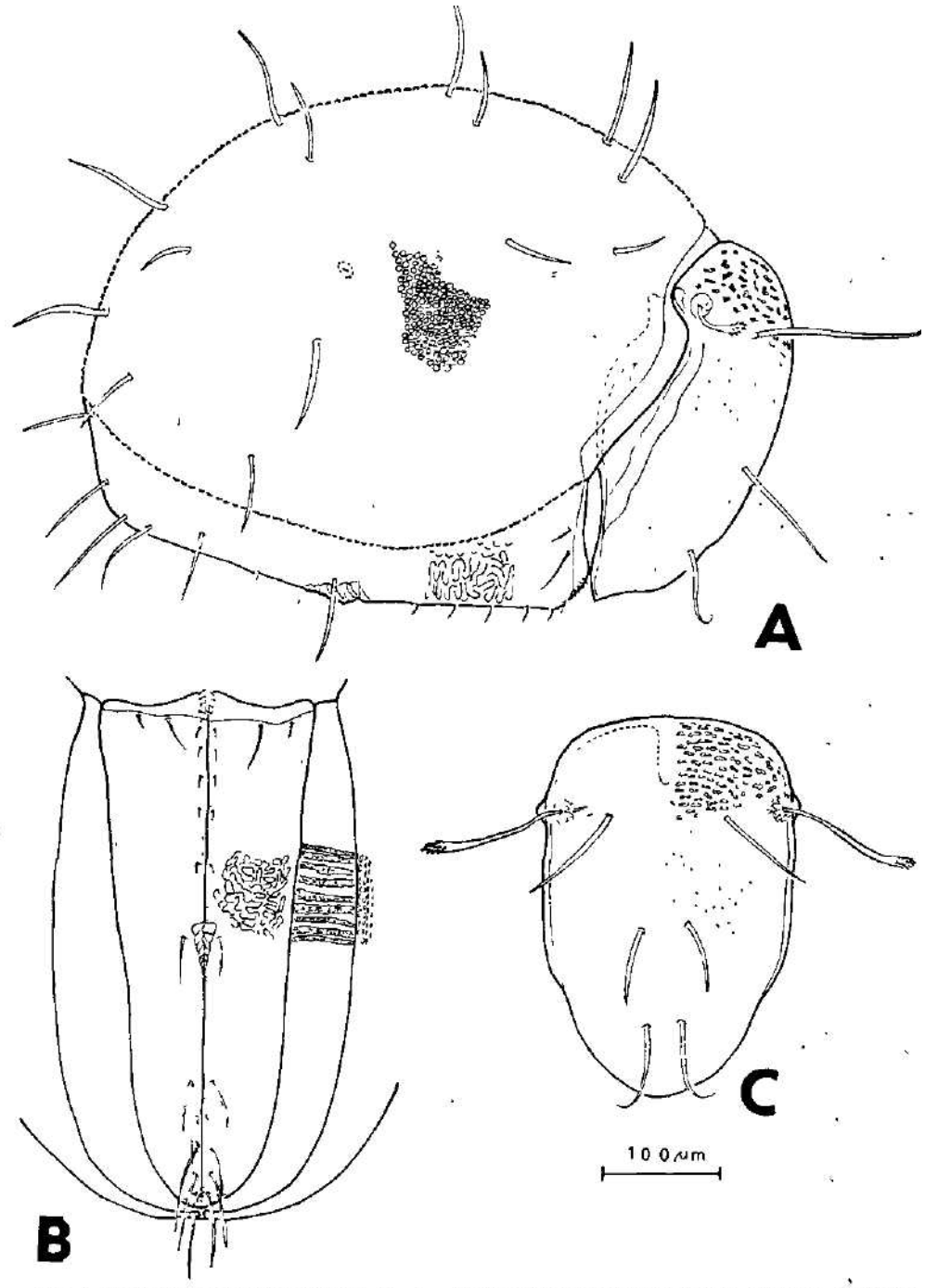

Fig. 4. *Euphthiracarus labyrinthicus* sp. n., A – aspis and notogaster without legs in lateral view, B – anogenital region in ventral view, C – aspis in dorsal view. Scale 100 µm.

Chelicerae (Fig. 5B) robust, wide, with blunt Trägardh's organ. Setae chb and cha smooth and equal in the length. Surface with tennuous small teeth. Measurements of digitus fixus 173x101 μm, digitus mobilis 64x41 μm.

Palps (Fig. 6A) with three segments. Blunt rutellum with 2 incisions chaetotactic formula 2-2-7(1).

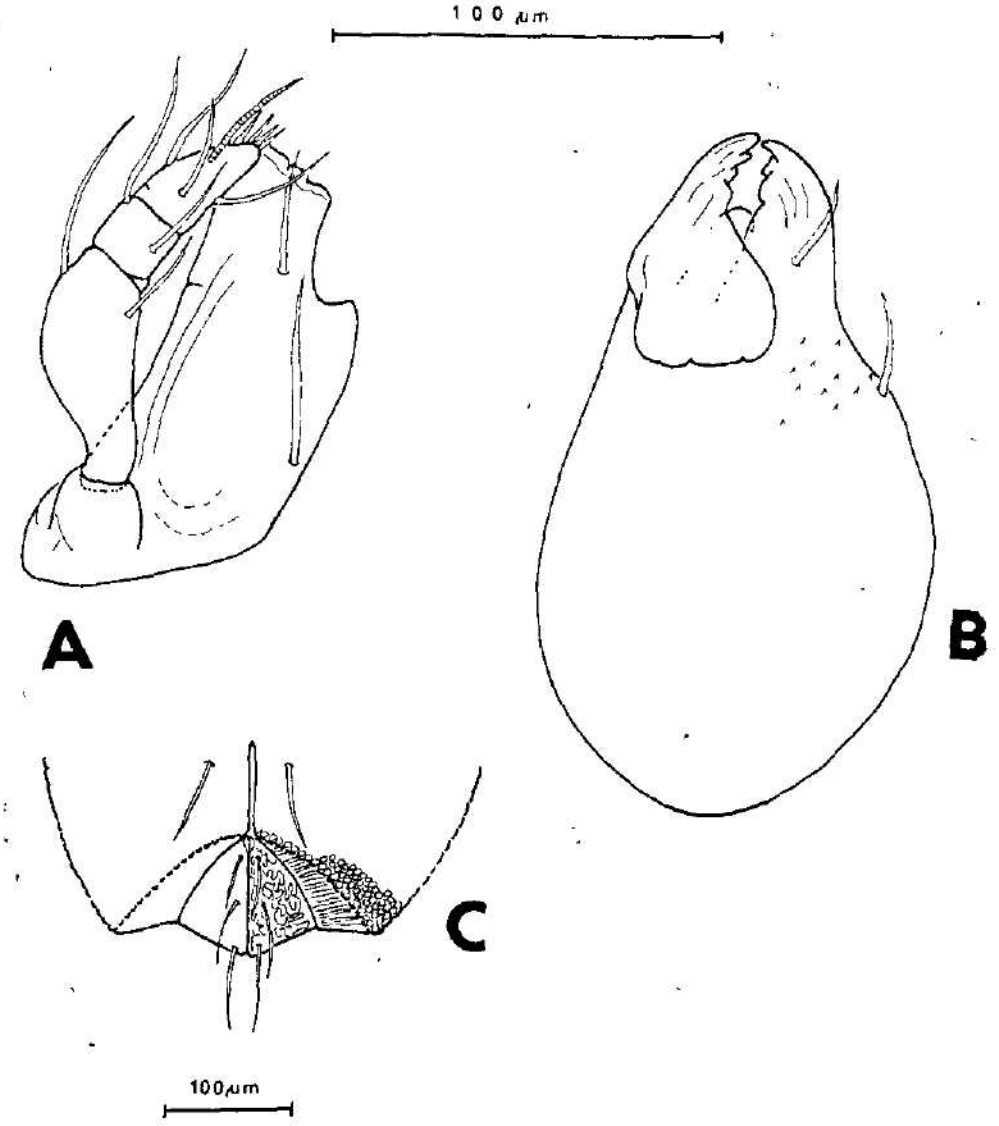

Fig. 5. *Euphthiracarus labyrinthicus* sp. n., A – right palpus with rutellum in ventral view, B – right chelicera in lateral view, C – posterior part of notogaster. Scale 100 μm.

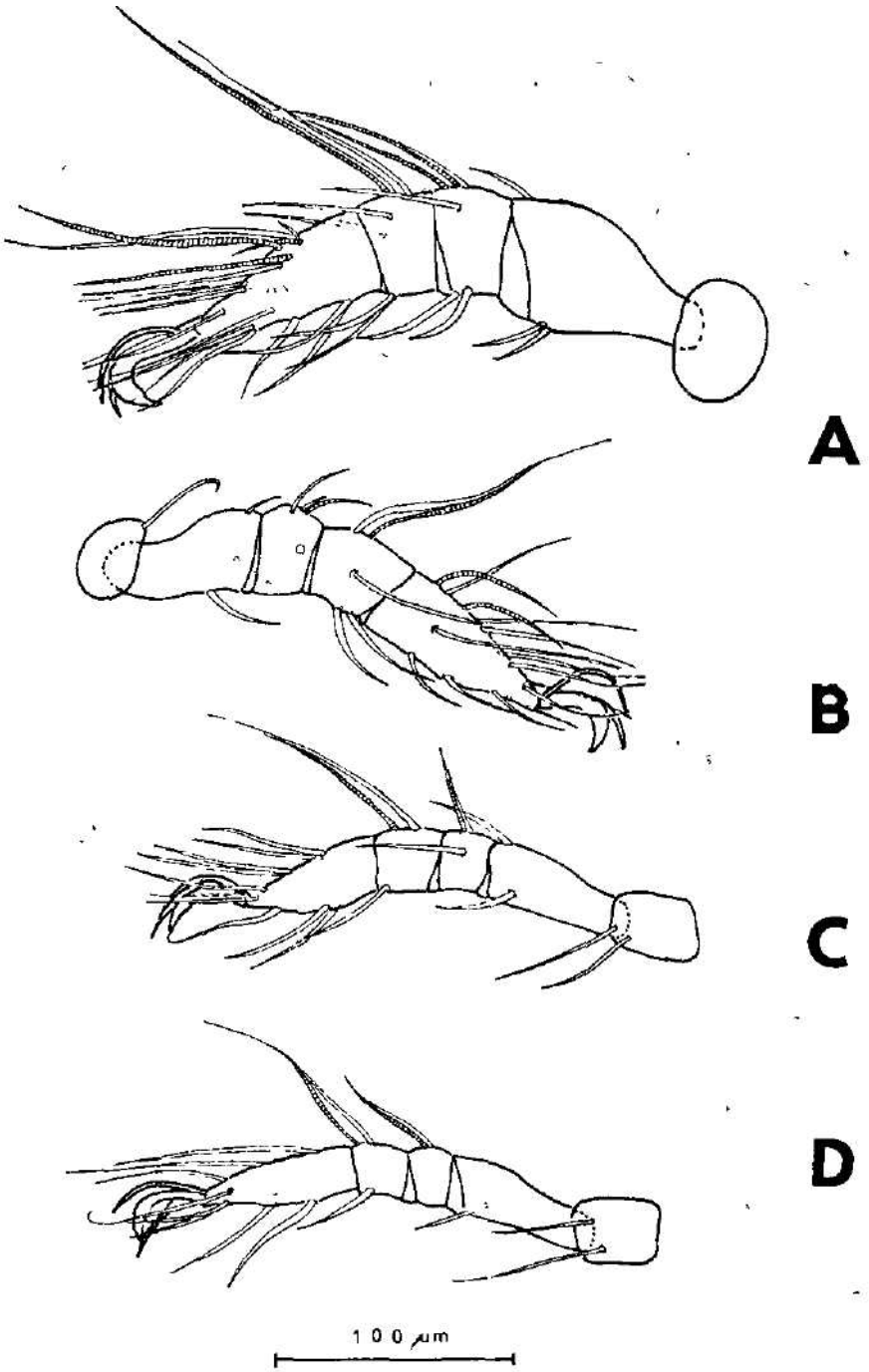

Fig. 6. *Euphthiracarus labyrinthicus* sp. n., A – left leg I in antiaxial view, B – right leg II in antiaxial view, C – left leg III in paraxial view, D – left leg IV in paraxial view. Scale 100 µm.

Legs (Fig. 6A-D) robust and short, all tridactylous, leg chaetotactic formulae I 0-3-4(2)-5(1)-14(3)-3, II 1-3-3(1)-4(1)-12(2)-3, III 2-2-2(1)-2(1)-10-3, IV 2-1-1(1)- 2(1)-8-3. Solenidia ω1-2, δ1 on the leg I, ω1-2 on the leg II without, others with accompanying setae.

A f f i n i t i e s : The new species belongs to *Euphthiracarus* species with clavate and roughed sensillus and with tridactylous legs. *E. polystretos* Walker differs from the new species in shorter interlamellar and lamellar and adgenital setae, and in the shape of sensillar clavus (W a l k e r , 1964). *E. takahashi* Aoki differs in the sculpturae on aspis, notogaster and anogenital region, and in roughed notogastral setae, and in longer genital ones. *E. foveolatus* Aoki has longer sensillus, shorter and roughed interlamellar setae, roughed notogastral ones and different sculpturae of aspis and anogenital region (A o k i , 1980). Sculpturae of anogenital region and the region between bothridia in posterior part of aspis are unique in the genus *Euphthiracarus*, and separate new species from other congeners.

L o c u s t y p i c u s . Vietnam, Tam Dao, 18 10. 1988, 1 300 m, primary foggy forest, litter sample, leg J. Stary

T y p e s : Holotypus (Ho-18. 10 1988-VIE-145) in slide is deposited in the author's collection in the Institute of Soil Biology, Czechoslovak, Academy of Sciences, České Budějovice.

A c k n o w l e d g e m e n t s

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BOOK REWIEW

H y d e J. E.: *Molecular Parasitology*. Open University Press, Milton Keynes 1990, 302 pp. Price (paper) Lstg. 16. 50

The author is a lecturer in the Department of Biochemistry and Applied Molecular Biology at the University of Manchester Institute of Science and Technology. As emphasized in the preface, the explosive advances in molecular biology and immunological techniques have had a dramatic impact on the understanding of parasitic organisms, a number of which are responsible for an immense incidence of suffering and death amongst humans and their domestic livestock, concentrated especially in the developing countries of the tropics and subtropics. The volume consists of nine extensively referenced chapters.

Chapter 1 introduces the major parasitic infections. malaria, trypanosomiasis, leishmaniasis, schistosomiasis, filariasis and other important nematode infections from the point of view of human disease, and describes briefly the epidemiology and life cycles. Chapters 2 and 3 cover the areas of methodology which have been essential in bringing molecular parasitology to it present level of sophistication. Nucleic acid and protein analysis, cloning parasite genes considering the gene libraries, library vectors, screening of gene banks, and expression of individual parasite genes are presented here. Chapter 4 shows how DNA and RNA sequence analysis in particular has dramatically improved methods of accurately identifying and classifying closely related parasites, as well as providing new insights into their evolution Chapter 5 provides a summary of the highly complex subjects of host immune responses to parasites including genetically determined resistance, build up of natural immunity, mechanisms of immunological defense, and evasion and suppresion of the immune response. This chapter acts as a prelude to chapter 6, where the progress towards devising effective anti-parasite vaccines is charted. Described are various types of vaccines against malarial plasmodia and other parasitic organisms.

Chapter 7 is concerned with the molecular approach to rational chemotherapy, namely with current antiparasitic drugs and major biochemical pathways that are actual or potential targets for chemotherapy, together with the techniques of structural analysis that form the basis for rational drug design. Chapter 8 introduces aspects of gene expression in vivo discussing variant surface antigen switching, discontinuous transcription, RNA editing, gene expression and chromosomal analysis, and heat shock proteins and their genes Last chapter discusses future prospects considering parasite transformation, genetic manipulation of insect vectors, multiple drug resistance, and blocking gene expression. The volume concludes with a glossary of organisms referred to in the text

Over the last decade, parasitologists have acquired an additional and very powerful tool in the form of molecular biology and associated technology These techniques have led to the analysis of parasitic systems in detail undreamed of only a generation ago. A major purpose of this book has been to illustrate the many possibilities for understanding and combating parasites that have been opened by application of the latest technological and conceptual advances This introduction to molecular parasitology will be of interest to parasitologists and molecular biologists alike and explores this highly important subject at a level which will be accessible to undergraduate students. It will provide competent reviews also to postgraduates and more advanced readers active in this area.

J. Jíra

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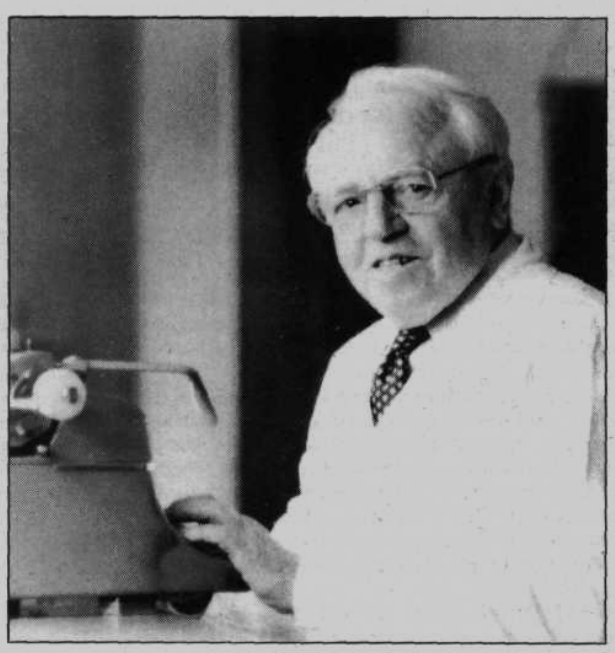
IN MEMORIAM OF PROF. RNDr. JOSEF KRATOCHVÍL, D.Sc., ORDINARY MEMBER - ACADEMICIAN OF THE CZECHOSLOVAK ACADEMY OF SCIENCES (6. 1. 1909 - 17. 2. 1992)

In the personality of Professor Josef Kratochvil and his work, a long historical stage of Czech and Slovak zoology has been concentrated. Even if, in a man life at all, the process is concerned of continual transformation of material being into immaterial memories, the scientist leaves behind himself the permanent vestige on the map of human knowledge. Professor Kratochvíl was the last from the generation of Czech polyhistors in zoological sciences acknowledged internationally, he worked actively in a series of scientific branches, namely even being entirely different and mutually unrelated. With that he could master difficulties of multilateral synthesis and in spite of his earnest concentration towards scientific work, he was always towards his coworkers and disciples a very careful teacher.



He was born on the ninth of January, 1909, at Kúsky, in the settlement of the municipality Lhotka near Velké Meziříčí as the tenth of twelve children. He achieved his secondary education at the real secondary school in Velké Meziříčí in 1920-1927. In 1927-1931, he studied at the Faculty of Natural History of the Masaryk University in Brno and earned means by subsidiary work to make his studies possible.He completed state examinations, all with honours, of zoology, botany, geology, mineralogy, petrography and geography during 1931-1932, rigorous examination then in 1933 and took his Doctor's Degree of Natural Sciences (RNDr.). Since 1930, he was extraordinary, and since 1932 till 1943, ordinary Assistant of the Zoological Institute of the University of Agriculture in Brno. He became Assistant Professor at the Faculty of Natural History of the Masaryk University in Brno as early as in 1937. After the occupation of Czechoslovakia by the Nazis and after the close of Czech universities, he worked in agricultural research (1943-1945). After the University of

Agriculture in Brno started again in October 1945, he was appointed its Professor for the branch of applied entomology and became chief of the Entomological Institute of this university In 1947, he was appointed Professor for the branch of zoology and became the head of the Institute of Zoology, later on of the Chair of Zoology of this university At this chair, he worked till 1960 In 1946, he was elected extraordinary member of the Royal Bohemian Society of Science, class math -nat sci , he was elected the member of the department of the Masaryk Academy of Work, and since the same year, he was also the member of the Czechoslovak Academy of Agriculture In 1952, he was elected Chairman of the Commission for Zoology of the Czechoslovak Academy of Sciences and head of its Editorial Board In 1954, he started to build the Laboratory od Vertebrate Zoology, C A S , in Brno, and from 1960 till 1976, he was director of the succeeding Institute of Vertebrate Zoology, C A S He worked in this institute (the present Institute of Systematic and Ecological Biology, C A S) as scientist and member of the Czechoslovak Academy of Sciences (in 1955 – corresponding member, in 1970 ordinary member - Academician) He defended the degree of the Doctor of Biological Sciences in 1964 He took part in organizational activities of the Academy in a whole series of functions, out of them, his membership in the presidium of the C A S in 1970–1975 should be named In 1937, he founded with his nearest coworkers the international scientific journal *Folia zoologica (*previously *Zoologicke a entomologicke listy)* and throughout the whole period, he was its editor in-chief till 1991, as well as of the series of small monographs Acta Sc Nat Brno Professor J Kratochvil paid his great and active attention also to activities in societies, here, the Czechoslovak Zoological Society at C A S was the nearest his heart, of which he was president since 1976, later on its honourable president

We are conscious of that curriculum vitae says practically nothing on the man working in the scientific branch for more than sixty years, neither on the pedagogue who educated numerous disciples during the same period Only partially, we compensated Prof J Kratochvil and the results of his work for this debt at the occasion of his 80th anniversary when the analysis and evaluation of his work were assumed by Č F o l k , V B a r u š F V i l č e k , J Z e j d a , J B u c h a r and O O l i v a (*Zpravy USEB, ČSAV,* 1989, pp 45–56) Today we want to stress only the fact that the scientist zoologist Prof Kratochvil will pertain with his work a permanent component of the Czech, Slovak and international scientific community He found in his disciples good followers in many zoological branches He fulfilled his human task.

SYNOPSIS OF PUBLICATIONS BY ACADEMICIAN JOSEF KRATOCHVÍL

A O r i g i n a l p a p e r s

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73 Über wenig bekannte Mohnschädlinge *Wiener landw Zeitung*, 92, 1943 303
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